




WORK PLAN
FOR
CHASE INTERIORS
FALCONER, NEW YORK

Prepared for:

United States Environmental Protection Agency
Region II - Response and Prevention Branch
Edison, New Jersey

Prepared by:

OHM Remediation Services Corp.
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April 7, 1994
OHM Project 15521-2R-021

357810



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SECTION 1.0 INTRODUCTION

OHM Remediation Services Corp. (OHM) has prepared this Project Work Plan in response to Delivery Order 2001-02-021 issued by the United States Environmental Protection Agency under Contract 68-S3-2001. This plan has been prepared from information contained in the scope of work received January 10, 1994 and from discussions held at the site scoping meeting held January 19, 1994.

1.1 SITE LOCATION

Chase Interiors is in an ⁱⁿactive facility located in a partially industrial area at 205-247 West Lister Avenue in Falconer, Chautauqua County, New York. The site is predominantly developed with a 150,000 - 200,000 square foot multistory building and is bordered on the south by a Erie Railroad track line. The building is facing north on the south side of Lister Avenue. The surrounding area is light commercial/residential. There is a box container plant to the west and a dead end street to the east.

1.2 SITE HISTORY

The facility was constructed in the late 1800s as the Wooster Wool Mill and operated until approximately 1968, when the plant closed. Between 1968 and 1975, the Crescent Tool Company occupied the building; little is known about operations conducted during this period. In 1975 or 1976, the property was purchased by Frank Chase Cabinet Makers, which subsequently became Chase Interiors.

The facility is predominantly a wood frame construction with some steel beams bracing areas that have subsided. The facility utilized various paints, thinners, shellacs, and adhesives which have flammable, corrosive, and toxic characteristics. The facility had three flammable storage areas to store materials, but the areas were not necessarily complying with appropriate regulations.

During the assessment, it was noted that there were four main storage areas. The materials were partially organized by a contractor hired by the mortgagor to conduct a cleanup. The areas were overcrowded with containers, some containers were leaking, five-gallon pails were stacked four high and "secured" with duct tape, with the distance between rows less than two feet. The shelves in the Paint Room were mostly cardboard-covered metal bars. Upon entering the room, readings with the OVA were above 100 units and maintained 30 units while in the room. There is no ventilation or sprinkler system; electrical power has been disconnected in the building.

1.3 PROJECT WORK PLAN ORGANIZATION

The project work plan has been developed to allow for amendments as additional areas of concern are identified. The following documents comprise the project work plan:

- Work Plan (WP) - The work plan discusses the specific tasks required by the scope of services. It identifies key personnel and equipment used to complete the cleanup. Appendix A will be left open to allow for work plan amendments to address new phases of work.
- Site Safety and Health Plan (SSHP) - This plan has been prepared by an OHM Health and Safety Specialist and reviewed by a Certified Industrial Hygienist (CIH). The SSHP is included as Appendix B of this work plan.

- **Sampling, Analysis and Quality Assurance Plan (SAQAP)** - This plan has been prepared by OHM's field analytical department. The SAQAP is included as Appendix C of this work plan.
- **Project Schedule** - The proposal has been prepared based on the scope of services identified in Delivery Order 2001-02-021. The schedule addresses the immediate tasks and will be amended accordingly.

SECTION 2.0 SCOPE OF WORK

OHM understands the scope of work to include:

- Stabilize and sample approximately 71 drums
- Stabilize and package 537 5-gallon and three 7-gallon pails
- Stabilize and labpack all one gallon containers
- Perform field haz-cat testing on all samples
- Provide analytical testing for disposal as required
- Decontaminate process equipment and facility structures
- Provide transportation and disposal of all hazardous substances
- Prepare a final project report

OHM has developed the project work plan and schedule to address the following initial tasks:

- Site scoping meeting
- Plans development
- Mobilization/site prep
- Drum handling
- Labpacking

As work progresses and the full spectrum of each task is identified, OHM will develop work plan and schedule amendments for EPA review and approval.

SECTION 3.0

TECHNICAL APPROACH

The following sections outline the methodology which OHM will employ to perform the scope of work.

3.1 SITE SCOPING MEETING

OHM representatives attended a site visit and scoping meeting with EPA representatives on January 19, 1994. The purpose of this meeting was to define the scope of work so that a detailed project work plan and schedule could be prepared.

3.2 PROJECT WORK PLAN DEVELOPMENT

The Project Work Plan includes the Site Safety and Health Plan (SSHP), the Sampling, Analysis and Quality Assurance Plan (SAQAP), and the Work Plan. The project team utilized to prepare this Project Work Plan consisted of the response manager, project safety officer, field analytical manager, deputy program manager, and support personnel such as technical editors, word processors, and draftsman. It is intended to present a detailed discussion of the technical approach and to be used as a guidance document for field implementation. Comments received from the OSC will be incorporated into this document and it will be finalized prior to starting work on site.

3.3 MOBILIZATION

Personnel and equipment required to perform the scope of work will be obtained from the nearest available resources. The following information outlines the proposed personnel and major equipment which will be mobilized for the execution of the project.

Personnel

- 1 - Response Manager
- 1 - Chemists
- 1 - Foreman/T&D Coordinator
- 4 - Recovery Technicians
- 1 - Project Control Technician

Equipment

- 1 - Bobcat with grappler
 - Level B, C, and D, protective clothing
- 3 - Support Vehicles
- 2 - Monitoring equipment
 - Various hand tools and sampling equipment
- 1 - Portable fume hood

3.4 SITE PREPARATION

Upon completion of mobilization, OHM will begin site preparation activities. OHM will conduct a site safety meeting prior to any site activities beginning. Once the safety meeting is completed, site setup will begin.

Site preparation activities will include the delineation of work and support zones. Caution tape will be used to establish the boundaries for the exclusion zone, contamination reduction zone, and the support zone outside the building. All areas inside the building will be considered an exclusion zone except for the CRZ and walkway to the CRZ.

Support zone preparation activities will include lab area set up for on-site HAZCAT operations. Office trailer setup, portable sanitary facility setup, and utility hook ups have previously been completed.

3.5 DRUM REMOVAL

A Bobcat equipped with a drum grappler will be utilized to move drums to a sampling staging area once drums have been removed from the current staging areas in the building by hand. Drums determined to be RCRA empty (40 CFR 261.7) will be placed into a separate area then transported to an approved drum recycler. All other drums and small containers throughout the facility will be collected and staged for sampling.

Prior to handling, each drum will be inspected to determine its integrity and the proper handling technique to be utilized. Each drum will also be monitored with a PID and Geiger counter and the readings recorded. Additionally, any markings found on the drum will be recorded on an individual drum log found in Figure 3.1.

Once drums have been inspected, technicians donned in Level B protective clothing will perform an inspection to determine the integrity of each drum and ultimately determine the most feasible removal technique. If a container's integrity is suspect it will be overpacked. If the integrity is such that a drum grappler would cause further damage to the container, technicians will manually overpack the drum in place using 85-gallon overpacks. If the integrity of the drum is determined to be sound it will be placed in the staging area.

3.5.1 Drum Sampling

The basic objective of this sampling program will be to collect a representative sample of the drum contents. If more than one phase (layer) is encountered in a drum, each phase will be sampled and analyzed separately. Specifically, we will acquire information that will aid in determining the presence and identification of the contaminants.

Remote opening of the containers if necessary, will be performed utilizing the Bobcat equipped with a brass-tipped punch. No personnel will be on the ground in the immediate area of the opening operations. Drums will be opened outside of the building on the east side.

Once a drum is opened, it will again be monitored with the PID and Geiger counter and the readings recorded. A representative sample will be obtained from each drum using pipettes, scoops or trowels as necessary. Split samples can be pulled if requested by EPA and sent to the identified lab for analysis. All sampling operations will be in accordance with the procedures identified in the Sampling, Analysis and Quality Assurance Plan (SAQAP).

Containers will be numbered sequentially and all available information about the container and its material will be recorded on the individual drum logs then entered into a database. This information will include drum type, condition, state of material in the drum, amount of contents, color of contents, and any drum markings or label information. After the drums are sampled, the following will be performed:

- A number will be affixed to each container (top and side)
- The drums will be sealed and covered to prevent intrusion from the elements. Drums demonstrating reactivity (e.g., fuming, water/air reactive) will be segregated and staged away from other drums

Following the sampling activities the overpacked drums will be secured.

Figure 2.1

DRUM INVENTORY LOG

3-4

Form 8054
First Tech. Supp
8/7/88



DRUM NO. _____

PROJECT INFORMATION

PROJECT LOCATION _____ PROJECT NUMBER _____
PROJECT CONTACT _____ PHONE _____
LOGGER _____ SAMPLER _____
WEATHER _____ DATE _____ TIME _____

DRUM TYPE: FIBER ☐ STEEL ☐ POLY ☐ STAINLESS STEEL ☐ NICKEL ☐
POLY-LINED ☐ RING TOP ☐ CLOSED TOP ☐ OVERPACKED ☐

DRUM CONDITION: MEETS DOT SPEC ☐ GOOD ☐ FAIR ☐ POOR ☐

DRUM SIZE: 55 ☐ 55 ☐ 42 ☐ 30 ☐ 18 ☐ 10 ☐ 5 ☐ OTHER _____

DRUM CONTENTS: AMOUNT FULL ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ < 1/4 ☐ MT ☐

DRUM STATE					COLOR	CLARITY	LAYER THICKNESS	FIELD ANALYSIS				
LAYERS	LIQUID	SOLID	GEL	SUSPENSE	USE STD COLORS	CLEAR	CLOUDY	OPAQUE	PH	SU	PID	SPM
T									DOSIMETER _____ mrem/hr			
M									OTHER _____			
B									DRUM LABELS/MARKINGS			

DOT HAZ _____ UN/NA _____

MFG NAME _____

CHEMICAL NAME _____

ADDITIONAL INFORMATION _____

LABORATORY COMPATABILITY DATA

Mark if Physical State and Color matches the above information. If not, stop analysis and notify project contact. Further work will not be paid for.

COMPATABILITY CAT. _____

ANALYSTS: _____

RADIATION: POS = _____ NEG = _____ mrem/hr

DATE PERFORMED: _____

DRUM STATE					COLOR	CLARITY	WATER SOL.	REACT	PH	HEAVY SOL.	PER	SED	SH	SL	SL. STK.	FLASH POINT	PCB IN OIL	PCB TEST GROUP
LAYERS	LIQUID	SOLID	GEL	SUSPENSE	USE STD COLORS	CLEAR	CLOUDY	OPAQUE	SOLUBILITY & PEL. DENSITY & GR. L.	A - AIR B - WATER	STD UNIT	0	1	2	3	4	5	6
T																		
M																		
B																		

Comments: _____

PCB Conc. _____ ppm Flash Point _____ °C Compatibility Comp. Bulk # _____

Data Reviewer: _____

Data Review Date: _____

Field Reviewer: _____

Field Review Date: _____

3.6 LABPACKING

Containers which are damaged will be placed in 55-gallon drums after compatibility tests. Containers which are in good condition will be packed into DOT approved "wrangler" shipping boxes. Items such as acids and bases will be placed in poly drums in labpack form. Other items such as aerosol cans will be packaged in the same manner. OHM will attempt to separate liquids versus solid cans of paint as the cost of solids disposal is higher. All DOT shippable boxes will be placed on pallets and secured prior to shipment. Drums will not be placed on pallets due to limited space in transporter trailers. It is OHM understanding that the (Wrangler) DOT shippable 1 yard³ containers are approved for flammable liquids.

3.7 TEARDOWN/DEMOBILIZATION

Upon completion of the scope of work, OHM will decontaminate equipment and tools used during the performance of the scope of work. A temporary equipment decontamination station will be constructed with multi-layered 6 mil polyethylene sheeting. Equipment requiring decontamination will be hand cleaned or pressure washed as necessary. The water generated will be collected and placed in temporary storage containers. All disposable protective clothing utilized during site operations, along with the material from the decontamination stations will be containerized for disposal. All work areas will be policed and secured. Personnel and equipment will then be demobilized to their respective origins.

3.8 TRANSPORTATION AND DISPOSAL

Prior to the removal of waste from the site, OHM will adhere to all applicable local, state and federal requirements. OHM will utilize only those transporters and disposal facilities that are fully licensed and/or permitted. All waste will be properly stored on site pending analytical data and acceptance approval.

Once the disposal analytical reports are received, the T&D specialist will evaluate the results and make recommendations on the appropriate disposal facility. Following OSC approval of the facility, the transportation and disposal coordinator will prepare the waste profile sheets for EPA review and signature, then forward each to the disposal facility for acceptance approval.

The response manager will coordinate the loadout of the waste with the OSC after notice of acceptance approval is received from the facility or transportation and disposal manager. OHM will make every effort to schedule the removal of all the wastes at the same time to minimize costs due to multiple mobilizations.

3.9 FINAL REPORT

Upon completion of project activities, OHM will submit a final project report to EPA if required. This report will include but not be limited to a summary of work performed, narrative of the scope of work, site safety, quality control, conclusions and any other unique or special situations documented. Also included shall be weekly on-site reports, drum inventory logs, drum log database, analytical results, waste profile sheets, waste manifests and certificates of disposal.

SECTION 4.0

PROJECT TEAM AND RESPONSIBILITIES

OHM has developed a project management team having the overall responsibility to ensure the successful completion of this project in a safe, efficient and cost effective manner. The personnel assigned to this project are trained in all phases of this remediation and have the ability to work closely with U.S. EPA representatives to achieve the desired results. The following OHM personnel will play a major role in the completion of this project:

Response Manager

The response manager will have the total responsibility for the technical, cost control and scheduling of the project. He will coordinate, direct and integrate all elements of the project team into one cohesive organization.

Within the realm of his responsibilities, the response manager will ensure the project schedule is followed as to achieve the timely completion of the project (mitigating possible delays). He will also manage the project so there are no cost overruns as well as define, implement and coordinate project invoicing procedures and tracking of invoicing schedules and payments.

As part of his liaison duties with the U.S. EPA, the response manager will submit a weekly progress report detailing the project status and schedule progress. The response manager will be responsible for the daily operations on site. He will report to the deputy program manager all daily project activities and ensure the scope of work is followed as directed by the OSC. The response manager will interface and direct other key project participants (i.e., project chemist, equipment operator) to assure timely and effective planning coordination and accomplishment of on-site operations tasks.

The response manager shall make certain the site-specific health and safety plan is adhered to. As such, it is his responsibility to identify and document any safety noncompliance on the project, including corrective actions required, subsequent follow-up and verification/documentation that the identified corrective actions have been implemented.

The response manager will also ensure that daily costs (RCMS 1900-55's) are submitted by the field clerk as required by the contract.

Project Chemist

The project chemist will be the leader of the on-site HAZCAT analysis. He is responsible for generating the project sampling, analytical and quality assurance plan; preparation and review for technical adequacy of all analytical laboratory documentation; preparation of field sampling equipment; calibration of field monitoring equipment; the satisfactory completion of sampling and analytical operations to meet the objectives of the project.

APPENDIX A
WORK PLAN AMENDMENTS

APPENDIX B

SITE SAFETY AND HEALTH PLAN



**SITE-SPECIFIC
HEALTH AND SAFETY PLAN
FOR
CHASE INTERIORS SITE
VILLAGE OF FALCONER, CHAUTAUQUA COUNTY, NEW YORK**

Prepared for:

**U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION II - REMOVAL ACTION BRANCH
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Prepared by:

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**April 5, 1994
OHM Project 15521-2R**

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SECTION 1.0 INTRODUCTION

OHM Remediation Services Corp. (OHM) is pleased to present this Health and Safety Plan (HASP) which has been developed for the United States Environmental Protection Agency, Region II.

This HASP documents the policies and procedures which protect workers and the public from potential hazards posed by work at this site. OHM considers safety the highest priority during work at a site containing potentially hazardous materials and has established a standard policy of zero exposure which must be upheld on all projects. All project activities will be conducted in a manner that minimizes the probability of injury, accident, or incident occurrence. The Site Safety Plan Acknowledgment (Appendix A) will be signed by all who actively participate at this project.

Although the plan focuses on the specific work activities planned for this site, it must remain flexible because of the nature of this work. Conditions may change and unforeseen situations may arise that require deviations from the original plan. This flexibility allows modification by the OHM supervisors and health and safety officials.

1.1 SITE HISTORY

The Chase Interiors Site was involved in the manufacture and assembly of wooden and metal display cases. This process included spray painting of metal cases. Recycling of spent solvents on-site was done using a small still. The facility used various paints, thinners, shellacs and adhesives, the principal solvent being a nitrocellulose lacquer. The facility was constructed in the late 1800's as a wool mill. Chase Interiors took over the facility in 1975-76.

The facility consists of a three story building of approximately 250,000 to 300,000 square feet. The roof is in poor condition and water damage is present throughout the building. The site currently is without electricity and shows obvious signs of scavenging and unauthorized entry.

1.2 SCOPE OF WORK

- Mobilization/Site Preparation
- Container Sampling
- Drum Handling
- Facility Decontamination
- Lab Packing
- Waste Stream Bulking

SECTION 2.0 KEY PERSONNEL

The USEPA On-Scene Coordinator (OSC), ERCS Program Manager (PM), Response Manager (RM), Certified Industrial Hygienist (CIH), Project Safety Officer (PSO) and TAT representatives share responsibilities for formulating and enforcing health and safety requirements, and implementing the HASP.

2.1 CERTIFIED INDUSTRIAL HYGIENIST

The CIH should be responsible for the contents of the HASP and should ensure that the HASP complies with all federal, state and local health and safety requirements. If necessary, the CIH can modify specific aspect of the HASP to adjust for on-site changes that affect safety. The CIH will coordinate with the SSO on all modifications to the HASP and will be available for consultation when required. The CIH will not necessarily be on site during OHM activities.

2.2 PROJECT SAFETY OFFICER

The PSO's primary responsibilities will be monitoring, including personal and environmental monitoring, conduct safety orientation, and review site safety practices and documentation. The PSO will make periodic visits to the site to fulfill his duties.

2.3 PROGRAM MANAGER (ERCS)

The PM has the overall responsibility for the project and to assure that the goals of the emergency response action are attained in a manner consistent with the HASP requirements. The PM will coordinate with the RM and the SSO to assure that the goals are completed in a manner consistent with the HASP.

2.4 RESPONSE MANAGER (ERCS)

The RM is responsible for field implementation of the HASP and Site Emergency Response and Contingency Plan. The RM is responsible for field implementation of the HASP. The RM will establish and ensure compliance with site control areas and procedures and coordinate these supervisory responsibilities with the site SSO.

2.5 ON-SCENE COORDINATOR (OSC)

The OSC, as the representative of the U.S. Environmental Protection Agency (EPA), is responsible for the overall project administration and coordinating health and safety standards for all individuals on site at all times. All applicable Occupational Health and Safety Administration standards shall be observed. However, each contractor, (as an employer under OSHA) is responsible for the health and safety of its employees.

2.6 TECHNICAL ASSISTANCE TEAM (TAT)

The Technical Assistance Team is responsible for providing the OSC with assistance and support in regard to all technical, regulatory, and safety aspects, of site activity. TAT is also available to advise the OSC on matters related to sampling, treating, packaging, labeling, transporting, and disposing of hazardous materials, but is not limited to that mentioned above.

2.7 EMPLOYEE SAFETY RESPONSIBILITY

Each employee is responsible for personal safety as well as the safety of others in the area. The employee will use all equipment provided in a safe and responsible manner as directed by the RM. All OHM personnel will follow the policies set forth in OHM's Employee Safety Guide and the OHM Health and Safety Procedures.

2.8 OSHA RECORDS

Required records including the OSHA 200 log are maintained at the OHM Divisional offices.

2.9 KEY SAFETY PERSONNEL

The following individuals share responsibility for health and safety at the site.

USEPA On-Scene Coordinator
(OSC)/ Site Safety Officer

Bonnie Green
USEPA Region II
2890 Woodbridge Avenue
Edison, NJ 08837
(908) 321-6647

ERCS Response Manager

Tracy Walker
(609) 421-7527 (pager)

TAT Representatives

Roy F. Weston, Inc.
1090 King Georges Post Road
Suite 201
Edison, NJ 08837
(908) 225-6116

ERCS Director,
Health and Safety

Kevin McMahon, M.S., CIH
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ERCS Vice President, Health
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800-231-7031

SECTION 3.0 JOB HAZARD ANALYSIS

This section outlines the potential chemical and physical hazards which workers may be exposed to during work on this project.

3.1 CHEMICAL HAZARDS

3.1 CHEMICAL HAZARDS			
CHEMICAL	EXPOSURE ROUTES	PEL/ TLV	HEALTH HAZARDS/ PHYSICAL HAZARDS
Carbon Tetrachloride	Skin, eye, inhalation, ingestion	5 ppm	Highly toxic; an irritant to skin, eyes, mucous membranes; absorbed through intact skin; solvent dermatitis a CNS depressant; a suspected human carcinogen
			Reacts violently with light metals, sodium, aluminum, magnesium; thermal decomposition can produce highly toxic, corrosive gases, phosgene and hydrogen chloride
Benzene	Skin, eye, inhalation, ingestion	1 PPM	Irritation of eyes, nose, throat, giddiness, headache, nausea, staggered walking; fatigue, lack of appetite, dermatitis, anemia; a carcinogen
			Flammable; reacts with strong oxidizers, acids
Toluene	Skin, eye, inhalation, ingestion	100 PPM	Fatigue, weakness, confusion, euphoria, dizziness, headache, dilated pupils, insomnia, numbness/tingling in hands, feet, dermatitis
			Highly flammable liquid; reacts with strong oxidizers

3.1 CHEMICAL HAZARDS			
CHEMICAL	EXPOSURE ROUTES	PEL/ TLV	HEALTH HAZARDS/ PHYSICAL HAZARDS
Ethyl Benzene	Skin, eye, inhalation, ingestion	100 PPM	Irritation of eyes, nose, throat; headache, dermatitis, dizziness, sleepiness
			Reacts with strong oxidizers, flammable
Xylene	Skin, eye, inhalation, ingestion	100 PPM	Dizziness, excitement, drowsiness, incoherent, staggering walking; eye, nose, throat irritation; nausea, vomiting, dermatitis
			Flammable; reacts with strong oxidizers
Petroleum Distillates	Skin, eye, inhalation, ingestion	100 ppm	Mucous membrane irritant; headache, dizziness, euphoria, unconsciousness; a CNS depressant; pulmonary edema from aspiration
			Reacts violently with oxidizers and oxidizing acids; emits toxic smoke and gas during combustion
Acetone	Skin, Eye, Inhalation, Ingestion	750 ppm	Narcotic in high concentrations; An irritant to the eyes, nose, throat, and central nervous system causing dizziness, vomiting, headache, and nausea; Defats the skin leading to dermatitis
			A dangerous fire hazard, keep away from heat, flames, and other sources of ignition; Incompatible with strong oxidizers, strong bases, caustics, chlorine compounds, strong acids, and ammonia

3.1 CHEMICAL HAZARDS			
CHEMICAL	EXPOSURE ROUTES	PEL/ TLV	HEALTH HAZARDS/ PHYSICAL HAZARDS
Polychlorinated Biphenyls	Skin, eye, inhalation, ingestion	0.5 mg/m ³	Irritation of eyes, skin; acne-form dermatitis; potential carcinogen; liver damage
			Reacts with strong oxidizers
Sodium Hydroxide	Skin, eye, inhalation, ingestion	0.5 mg/m ³	A strong corrosive agent to all body tissues; permanent blindness can result from eye contact; deep ulcer formation on skin
			Releases large quantities of heat in contact with water; reacts violently with acids; releases toxic gases in contact with metals, arsenic; can cause fires, explosions in contact with organic peroxides and toxic gases
Methyl Amyl Ketone	Skin, eye, inhalation, ingestion	50 ppm	A skin irritant; toxic by ingestion; headache, nausea, dizziness, irritation of nose, throat and mucous membrane
			A combustible liquid; reacts with oxidizers and peroxides; toxic gases and particulates produced from thermal decomposition
Ethyl Acetate	Skin, eye, inhalation, ingestion	400 ppm	A strong skin and eye irritant; clouds cornea; highly irritating to mucous membranes and respiratory tract; poisonous by inhalation; headache, nausea, dizziness, euphoria, burning of eyes nose and upper respiratory system
			A highly flammable liquid; reacts violently with oxidizers; moderate explosion hazard when exposed to open flame; toxic gases and particulates produced from thermal decomposition

3.1 CHEMICAL HAZARDS			
CHEMICAL	EXPOSURE ROUTES	PEL/ TLV	HEALTH HAZARDS/ PHYSICAL HAZARDS
Butyl Acetate	Skin, eye, inhalation, ingestion	150 ppm	A skin and severe eye irritant; conjunctive effects, irritating to nose, throat, respiratory tract; burning of eyes, mucous membranes and respiratory tract; an allergin; may cause teratogenic effects
			A highly flammable liquid; reacts violently with oxidizers; moderate explosion hazard when exposed to open flame; toxic gases and particulates produced from thermal decomposition
Isopropyl Alcohol	Skin, eye, inhalation, ingestion	400 ppm	A skin and eye irritant; a questionable carcinogen; headache, nausea, dizziness, vomiting, respiratory depression, lowered pulse and blood pressure, narcosis, mental depression, hallucinations, coma
			A flammable liquid; reacts strongly with oxidizers; moderate explosion hazard when exposed to open flame; toxic gases and particulates produced from thermal decomposition
Methanol	Skin, eye, inhalation, ingestion	200 ppm	An eye and skin irritant; a poison by ingestion; headache, cough, lacrimation, nausea, vomiting, optic nerve neuropathy, visual field changes; an experimental teratogen
			A flammable liquid; reacts strongly with oxidizers; explosion hazard when exposed to open flame; toxic gases and particulates produced from thermal decomposition

3.1 CHEMICAL HAZARDS			
CHEMICAL	EXPOSURE ROUTES	PEL/ TLV	HEALTH HAZARDS/ PHYSICAL HAZARDS
Nitrocellulose Resin	Skin, eye, inhalation, ingestion	N/E	An irritant to skin and eyes
			A flammable solid; reacts with strong acid oxidizers; toxic gases and particulates produced from thermal decomposition
Cyclohexylamine	Skin, eye, inhalation, ingestion	10 ppm	A severe skin irritant; burning of eyes, nose and respiratory tract; dermatitis; convulsions; experimental teratogen
			A dangerous fire hazard when exposed heat, flame or oxidizers; toxic gases and particulates produced from thermal decomposition
Silver Nitrate	Skin, eye, inhalation, ingestion	0.01 mg/m3	A corrosive irritant to skin, eyes and mucous membranes; nausea, metallic taste, abdominal pain; ingestion can be fatal
			A powerful oxidizer; reacts with metals, petroleum hydrocarbons, alkali liquids and solids, halogens and some acids
2-butoxyethanol	Skin, eye, inhalation, ingestion	25 ppm	A skin irritant; headache, nausea, vomiting, burning of eyes, nose and throat; an experimental teratogen; reproductive effects;
			A flammable solid; reacts with strong acid oxidizers; toxic gases and particulates produced from thermal decomposition

3.1 CHEMICAL HAZARDS			
CHEMICAL	EXPOSURE ROUTES	PEL/ TLV	HEALTH HAZARDS/ PHYSICAL HAZARDS
Sodium Polyacrylate	Skin, eye, inhalation, ingestion	N/E	An eye irritant
			toxic gases and particulates produced from thermal decomposition
diethylaminoethanol	Skin, eye, inhalation, ingestion	10 ppm SKIN	A skin and severe eye irritant; conjunctive effects, irritating to nose, throat, respiratory tract; burning of eyes, mucous membranes and respiratory tract; nausea, vomiting
			A combustible liquid; reacts with strong acid oxidizers; toxic gases and particulates produced from thermal decomposition
Trisodium Phosphate	Skin, eye, inhalation, ingestion	N/E	A corrosive solid; burning of eyes, throat, mucous membranes; abdominal pain, nausea, vomiting
			An alkali solid; reacts with acids, metals; thermal decomposition releases toxic gases and particulates

Personnel will be removed from the work site and placed under observation immediately if the following initial symptoms persist:

- Dizziness or stupor
- Nausea, headaches, or cramps
- Irritation of the eyes, nose, or throat
- Euphoria
- Chest pains and coughing
- Rashes or burns

3.2 PHYSICAL HAZARDS

To minimize physical hazards, OHM has developed standard safety protocols which will be followed at all times. Failure to follow safety protocols will result in expulsion of a crew member from the site.

All OHM personnel are familiar with the field activities which will be conducted at the site. They are trained to work safely under various field conditions. The SS and SSO will observe the general work practices of each crew member and equipment operator, and enforce safe procedures to minimize physical hazards. Also, hard hats, safety glasses, and steel-toe safety boots are required in all areas of the site.

3.3 ENVIRONMENTAL HAZARDS

Environmental factors such as weather, wild animals, insects, and irritant plants always pose a hazard when performing outdoor tasks. The SSO and SS will make every effort to alleviate these hazards should they arise.

3.3.1 Heat Stress

The combination of warm ambient temperature and protective clothing increases the potential for heat stress. In particular:

- Heat rash
- Heat cramps
- Heat exhaustion
- Heat stroke

Heat stress is covered in detail during our 40-hour OSHA 29 CFR 1910.120 approved pre-employment course. In addition, this information is discussed during safety meetings before each workday. Workers are encouraged to increase consumption of water and electrolyte-containing beverages such as Gatorade.

At a minimum, workers will break every 2 hours for 10- to 15-minute rest periods. In addition, workers are encouraged to take rests whenever they feel any adverse effects that may be heat-related. The frequency of breaks may need to be increased upon worker recommendation to the SSO and SS.

A work/rest schedule can be calculated based on heat stress monitoring results. Monitoring consists of taking the radial pulse of a worker for 30 seconds immediately after exiting the work area. The frequency of monitoring is provided herein.

AMBIENT TEMPERATURE	LEVEL D PPE	LEVEL C PPE/ MODIFIED LEVEL D
90° F or above	After 45 minutes of work	After 15 minutes of work
87.5 F-90 F	After 60 minutes of work	After 30 minutes of work
82.5-87.5 F	After 90 minutes of work	After 60 minutes of work
77.5-82.5 F	After 120 minutes of work	After 90 minutes of work
72.5-77.5 F	After 150 minutes of work	After 120 minutes of work

If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by 1/3 and keep the rest period the same. If the heart rate still exceeds 110 beats per minute at the next rest period, increase the following rest period by 1/3. The initial rest period should be at least 5 minutes.

Monitoring for heat stress will begin when the ambient temperature reaches or exceeds 70 degrees Fahrenheit, when wearing Level C PPE, or 80 degrees Fahrenheit for site activities performed in Level D.

3.3.2 Exposure to Cold

With outdoor work in the winter months, the potential exists for hypothermia and frostbite.

Protective clothing greatly reduces the possibility of hypothermia in workers. However, personnel will be instructed to wear warm clothing and to stop work to obtain more clothing if they become too cold. Employees will also be advised to change into dry clothes if their clothing becomes wet from perspiration or from exposure to precipitation.

In cold weather, the potential for frostbite exists, especially in body extremities. Personnel will be instructed to pay particular attention to hands, feet, and any exposed skin when dressing. Personnel will be advised to obtain more clothing if they begin to experience loss of sensation due to cold exposure.

Employees will be encouraged to use the heated shelters on site at regular intervals depending upon the severity of ambient temperatures. Symptoms of cold stress, including heavy shivering, excessive fatigue, drowsiness, irritability, or euphoria necessitate immediate return to the shelter.

3.3.3 Biological Hazards

- POISON IVY (Rhus Radicans)

Poison Ivy may be found at the site. It is highly recommended that all personnel entering into an area with poison ivy wear a minimum of a paper tyvek, to avoid skin contact.

Contact with poisonous plants:

Characteristic reactions

The majority of skin reactions following contact with offending plants are allergic in nature and characterized by:

- General symptoms of headache and fever
- Itching
- Redness
- A rash

Some of the most common and most severe allergic reactions result from contact with plants of the poison ivy group, including poison oak and poison sumac. Such plants produce severe rash characterized by redness, blisters, swelling, and intense burning and itching. The victim may develop a high fever and feel very ill. Ordinarily, the rash begins within a few hours after exposure, but may be delayed 24 to 48 hours.

Distinguishing Features of Poison Ivy Group Plants

The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets each. Both plants have greenish-white flowers and berries that grow in clusters.

First Aid

- a. Remove contaminated clothing; wash all exposed areas thoroughly with soap and water, followed by rubbing alcohol.
- b. Apply calamine or other soothing lotion if rash is mild.
- c. Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity.

- TICKS

Heavily vegetated areas of a site may have ticks. It is highly recommended that all personnel walking through such areas wear a minimum of a paper tyvek and latex boot covers. The ticks will stand out against the light colors. A tick repellent or insect containing DEET is also suggested.

Ticks can transmit several diseases, including Rocky Mountain spotted fever, a disease that occurs in the eastern portion of the United States as well as the western portion, and Lyme disease. Ticks adhere tenaciously to the skin or scalp. There is some evidence that the longer an infected tick remains attached, the greater is the chance that it will transmit disease.

First Aid

- a. Cover the tick with heavy oil (mineral, salad, or machine) to close its breathing pores. The tick may disengage at once; if not, allow oil to remain in place for a half hour. Carefully (slowly and gently) remove the tick with tweezers, taking care that all parts are removed.
- b. With soap and water, thoroughly, but gently, scrub the area from which the tick has been removed, because disease germs may be present on the skin; also wipe the bite area with an antiseptic. Although use of tweezers for the removal of the tick and application of heat to the tick's body often have been attempted, these methods may leave tick parts in the wound or may injure the skin.

- c. If you have been bitten, place the tick in a jar labeled with the date, location of the bite, and the location acquired. If any symptom appears, such as an expanding red rash, contact a physician immediately.

- LYME DISEASE

Lyme disease may cause a number of medical conditions, including arthritis, that can be treated if you recognize the symptoms early and see your doctor. Early signs may include a flu-like illness, an expanding skin rash and joint pain. If left untreated, Lyme disease can cause serious nerve and heart problems as well as a disabling type of arthritis.

You are more likely to spot early signs of Lyme disease rather than see the tick or its bite. This is because the tick is so small (about the size of the head of a common pin or a period on this page and a little larger after they fill with blood), you may miss it or signs of a bite. However, it is also easy to miss the early symptoms of Lyme disease.

In its early stage, Lyme disease may be a mild illness with symptoms like the flu. It can include a stiff neck, chills, fever, sore throat, headache, fatigue, and joint pain. But this flu-like illness is usually out of season, commonly happening between May and October when ticks bite.

Most people develop a large, expanding skin rash around the area of the bite. Some people may get more than one rash. The rash may feel hot to the touch and may be painful. Rashes vary in size, shape, and color, but often look like a red ring with a clear center. The outer edges expand in size. Its easy to miss the rash and the connection between the rash and the tick bite. The rash develops from three days to as long as a month after the tick bite. Almost one third of those with Lyme disease never get the rash.

Joint or muscle pain may be another early sign of Lime disease. These aches and pains may be easy to confuse with the pain that comes from other types of arthritis. However, unlike many other types of arthritis, this pain seems to move or travel from joint to joint.

In later stages, Lyme disease may be confused with other medical problems. These problems can develop months to years after the first tick bite.

Early treatment of Lyme disease symptoms with antibiotics can prevent the more serious medical problems of later stages. If you suspect that you have symptoms of Lime disease, contact your doctor.

Lyme disease can cause problems with the nervous system that look like other diseases. These include symptoms of stiff neck, severe headache, and fatigue usually linked to meningitis. They may also include pain and drooping of the muscles on the face, called Bell's Palsy. Lyme disease can also mimic symptoms of multiple sclerosis or other types of paralysis.

Lyme disease can also cause serious but reversible heart problems, such as irregular heart beat. Finally, Lyme disease can result in a disabling, chronic type of arthritis that most often affects the knees. Treatment is more difficult and less successful in later stages. Researchers think these more serious problems may be linked to how the body's defence or immune system responds to the infection.

3.4 TASK-SPECIFIC RISK ASSESSMENT

3.4.1 ACTIVITY HAZARD ANALYSIS FOR SITE PREPARATION		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Set-up Support Zone/ Decontamination Area	Struck By/ Against Heavy Equipment	<ul style="list-style-type: none"> • Use reflective warning vests worn when exposed to vehicular traffic • Avoid equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals
	Slips, Trips, Falls	<ul style="list-style-type: none"> • Clear walkways, work areas of equipment, tools and debris • Mark, identify, or barricade other obstructions
	Handling Heavy Objects	<ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Sharp Objects	<ul style="list-style-type: none"> • Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use
	Contact Dermatitis	<ul style="list-style-type: none"> • Wear PPE to avoid skin contact with contaminated soil, plants, or other skin irritants • Identify and review poisonous plants with workers
	High Noise Levels	<ul style="list-style-type: none"> • Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)
	High/Low Ambient Temperature	<ul style="list-style-type: none"> • Monitor for Heat/Cold stress in accordance with OHM Health and Safety Procedures Manual

3.4.2 ACTIVITY HAZARD ANALYSIS FOR DRUM HANDLING		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Staging/Overpacking Drums	Handling Heavy Objects	<ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Slips, Trips, Falls	<ul style="list-style-type: none"> • Clear walkways, work areas of equipment, tools, and debris • Mark, identify, or barricade other obstructions
	Fire/ Explosion	<ul style="list-style-type: none"> • Eliminate sources of ignition from the work area • Prohibit smoking in work areas • Provide ABC (or equivalent) fire extinguishers for all work, flammable storage areas; fuel powered generators and compressors • Store flammable liquids in well ventilated areas • Post "NO SMOKING" signs • Store combustible materials away from flammables • Store, all compressed gas cylinders upright, caps in place when not in use • Separate Flammables and Oxidizers by 20 feet
	Sharp Objects	<ul style="list-style-type: none"> • Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use
	Struck by, Against Heavy Equipment, Protruding Objects	<ul style="list-style-type: none"> • Use reflective warning vests worn when exposed to vehicular traffic • Avoid equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals
	Inhalation and Contact with Hazardous Substances	<ul style="list-style-type: none"> • Provide workers proper skin, eye and respiratory protection based on the exposure hazards present (see section 5 for Level [A,B,C,D] protection) • Review contaminant chemical MSDSs with workers before operations begin
	High/Low Ambient Temperature	<ul style="list-style-type: none"> • Monitor for Heat/Cold stress in accordance with OHM Health and Safety Procedures Manual

3.4.3 ACTIVITY HAZARD ANALYSIS FOR CONTAINER SAMPLING		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Container Sampling	Sharp Objects	<ul style="list-style-type: none"> • Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use
	Handling Heavy Objects	<ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Slips, Trips, Falls	<ul style="list-style-type: none"> • Clear walkways, work areas of equipment, tools, and debris • Mark, identify, or barricade other obstructions
	Inhalation and Contact with Hazardous Substances	<ul style="list-style-type: none"> • Provide workers proper skin, eye and respiratory protection based on the exposure hazards present • Review contaminant chemical MSDSs with workers before operations begin
	High/Low Ambient Temperature	<ul style="list-style-type: none"> • Monitor for Heat/Cold stress in accordance with OHM Health and Safety Procedures Manual

3.4.4 ACTIVITY HAZARD ANALYSIS FACILITY DECONTAMINATION		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Walls, Floors, Sumps, Pits	Struck by, Against Heavy Equipment, Protruding Objects	<ul style="list-style-type: none"> • Use reflective warning vests when exposed to vehicular traffic • Avoid equipment swing areas • Make eye contact with operators before approaching equipment • Wear hard hats, safety glasses with side shields, and steel-toe safety boots • Understand and review hand signals
	Slips, Trips, Falls	<ul style="list-style-type: none"> • Clear walkways, work areas of equipment, tools and debris • Mark, identify, or barricade other obstructions
	Handling Heavy Objects	<ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Electrical Shock	<ul style="list-style-type: none"> • De-energize or shut off utility lines at their source before work begins • Use double insulated or properly grounded electric power-operated tools • Maintain tools in a safe condition • Provide an equipment-grounding conductor program or employ ground-fault circuit interrupters • Use qualified electricians to hook up electrical circuits • Inspect all extension cords daily for structural integrity, ground continuity, and damaged insulation • Cover or elevate electric wire or flexible cord passing through work areas to protect from damage • Keep all plugs and receptacles out of water • Use approved water-proof, weather-proof type if exposure to moisture is likely • Inspect all electrical power circuits prior to commencing work • Follow Lockout-Tagout procedures in accordance with OHM Health and Safety Procedures Manual

3.4.4 ACTIVITY HAZARD ANALYSIS FACILITY DECONTAMINATION		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Walls, Floors, Sumps, Pits (Continued)	Sharp Objects	<ul style="list-style-type: none"> • Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use
	High Noise Levels	<ul style="list-style-type: none"> • Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)
	Burns	<ul style="list-style-type: none"> • Use proper work gloves, face shield/safety goggles, and leather apron to protect workers from skin burns when welding, cutting, and burning
	Inhalation and Contact with Hazardous Substances	<ul style="list-style-type: none"> • Provide workers proper skin, eye and respiratory protection based on the exposure hazards present • Review MSDS information before beginning work

3.4.5 ACTIVITY HAZARD ANALYSIS FOR LAB PACKING UNKNOWNNS		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Labpacking Drums	Handling Heavy Objects	<ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Slips, Trips, Falls	<ul style="list-style-type: none"> • Clear walkways, work areas of equipment, tools, excavated material, and other debris • Mark, identify, or barricade other obstructions
	Fire/ Explosion	<ul style="list-style-type: none"> • Eliminate sources of ignition from the work area • Smoking is prohibited • Provide ABC (or equivalent) fire extinguishers for all work and flammable storage areas, fuel powered generator and compressor locations • Store flammable liquids in well ventilated areas • Post "NO SMOKING" signs • Store combustible materials away from flammables • Store, all compressed gas cylinders upright, caps in place when not in use • Separate Flammables and Oxidizers by 20 feet
	Sharp Objects	<ul style="list-style-type: none"> • Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use
	Struck by, Against Heavy Equipment, Protruding Objects, Splashes	<ul style="list-style-type: none"> • Avoid equipment swing areas • Make eye contact with operators before approaching equipment • Wear hard hats, splash shields, and steel-toe safety boots • Understand and review hand signals
	Inhalation and Contact with Hazardous Substances	<ul style="list-style-type: none"> • Provide workers proper skin, eye and respiratory protection based on the exposure hazards present • Review contaminant chemical MSDSs with workers before operations begin
	High/Low Ambient Temperature	<ul style="list-style-type: none"> • Monitor for Heat/Cold stress in accordance with OHM Health and Safety Procedures Manual

3.4.6 ACTIVITY HAZARD ANALYSIS FOR WASTE STREAM BULKING		
TASK BREAKDOWN	POTENTIAL HAZARDS	HAZARD CONTROL MEASURES
Stream Bulking, Treatment and Transfer	Inhalation and Contact with Hazardous Substances	<ul style="list-style-type: none"> • Provide workers proper skin, eye and respiratory protection based on the exposure hazards present • Review contaminant chemical MSDSs with workers before operations begin
	Fire/ Explosion	<ul style="list-style-type: none"> • Eliminate sources of ignition from the work area • Prohibit smoking • Provide ABC (or equivalent) fire extinguishers for all work and flammable storage areas, fuel powered generators and compressors • Store flammable liquids in well ventilated areas • Post "NO SMOKING" signs • Store combustible materials away from flammables • Store all compressed gas cylinders upright, caps in place when not in use • Separate Flammables and Oxidizers by 20 feet
	Handling Heavy Objects	<ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads
	Slips, Trips, Falls	<ul style="list-style-type: none"> • Clear walkways of equipment, tools and debris • Mark, identify, or barricade other obstructions.
	Struck by, Against Heavy Equipment, Protruding Objects	<ul style="list-style-type: none"> • Use reflective warning vests when exposed to vehicular traffic • Avoid equipment swing areas • Make eye contact with operators before approaching equipment • Barricade or enclose the work area • Restrict entry to the work area to authorized personnel • Wear hard hats, safety glasses with side shields, and steel-toe safety boots

SECTION 4.0

WORK AND SUPPORT AREAS

To prevent migration of contamination caused through tracking by personnel or equipment, work areas and personal protective equipment will be clearly specified prior to beginning operations. OHM has designated work areas or zones as suggested by the NIOSH/OSHA/USCG/EPA'S document titled, "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities." Each work area will be divided into three zones as follows:

- An Exclusion or "hot" Zone (EZ)
- A Contamination-Reduction Zone (CRZ)
- A Support Zone (SZ)

4.1 EXCLUSION ZONE

The EZ is the area suspected of contamination and presents the greatest potential for worker exposure. Personnel entering the area must wear the mandated level of protection for that area. In certain instances, different levels of protection will be required depending on the tasks and monitoring performed within that zone. The EZ for this project will be the interior of the Chase Interiors' Building.

4.2 CONTAMINATION-REDUCTION ZONE

The CRZ or transition zone will be established between the EZ and SZ. In this area, personnel will begin the sequential decontamination process required to exit the EZ. To prevent off-site migration of contamination and for personnel accountability, all personnel will enter and exit the EZ through the CRZ. The CRZ will be those areas used for access and egress of the EZ and other limited areas where decontamination procedures take place.

4.3 SUPPORT ZONE

The SZ serves as a clean, control area. Operational support facilities are located within the SZ. Normal work clothing and support equipment are appropriate in this zone. Contaminated equipment, or clothing will not be allowed in the SZ. The support facilities should be located upwind of site activities. There will be a clearly marked controlled access point from the SZ into the CRZ and EZ that is monitored closely by the SSO and the SS to ensure proper safety protocols are followed. The SZ for this project will include the crew trailer, office trailers and those areas designated as site access for deliveries and security.

4.4 GENERAL

The following items are requirements to protect the health and safety of workers and will be discussed in the safety briefing prior to initiating work on the site.

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand to mouth transfer and ingestion of contamination is prohibited in the EZ and CRZs.
- Hands and face must be washed upon leaving the EZ and before eating, drinking, chewing gum or tobacco and smoking or other activities which may result in ingestion of contamination.

- A buddy system will be used. Hand signals will be established to maintain communication.
- During site operations, each worker will consider himself as a safety backup to his partner. Off-site personnel provide emergency assistance. All personnel will be aware of dangerous situations that may develop.
- Visual contact will be maintained between buddies on site when performing hazardous duties.
- No personnel will be admitted to the site without the proper safety equipment, training, and medical surveillance certification.
- All personnel must comply with established safety procedures. Any staff member who does not comply with safety policy, as established by the SSO or the SS, will be immediately dismissed from the site.
- Proper decontamination procedures must be followed before leaving the site.
- All employees and visitors must sign in and out of the site.

SECTION 5.0 PROTECTIVE EQUIPMENT

This section addresses the various levels of personal protective equipment (PPE) which are or may be required at this job site. OHM personnel are trained in the use of all PPE utilized.

5.1 ANTICIPATED PROTECTION LEVELS

<i>TASK</i>	<i>PROTECTION LEVEL</i>	<i>COMMENTS/MODIFICATIONS</i>
Site Preparation	Level D	Hard Hat, eye/face protection, proper work gloves for tasks
Drum Handling	Level B/C	Level B for handling all liquid unknowns; splash suit, suran or acid gear, nitrile gloves, neoprene boots; Level C for handling solids, dust and debris (no Level B work in same area)
Container Sampling	Level B	Level B for handling all liquid unknowns; splash suit, suran or acid gear, nitrile gloves, neoprene boots
Facility Decontamination	Level C/B	Upgrade to Level B if action levels in section 7 of the HASP are exceeded
Lab Packing	Level B/C	Level B for handling all liquids; splash suit, suran or acid gear, nitrile gloves, neoprene boots; Level C for handling solids, dust and debris (no Level B work in same area)
Waste Stream Bulking	Level B	Level B for handling all liquid unknowns; splash suit, suran or acid gear, nitrile gloves, neoprene boots
CRZ Workers	Level D	
SZ Workers	Level D	

5.2 PROTECTION LEVEL DESCRIPTIONS

This sections lists the minimum requirements for each protection level. Modification to these requirements will be noted above.

5.2.1 Level D

Level D consists of the following:

- Safety glasses with side shields
- Hard hat
- Steel-toed work boots
- Work clothing as prescribed by weather

5.2.2 Modified Level D

Modified Level D consists of the following:

- Safety glasses with side shields
- Hard hat
- Steel-toed work boots
- Nitrile, neoprene, or PVC overboots or vinyl booties
- Outer nitrile, neoprene, or PVC gloves over latex sample gloves
- Face shield (when projectiles or splashes pose a hazard)
- Tyvek coverall [Saranex Tyveks (Sarans) and PVC acid gear will be required when workers have a potential to be exposed to contaminated liquids or sludges.]

5.2.3 Level C

Level C consists of the following:

- Full-face, air-purifying respirator with GMC-H cartridges
- Hooded Tyvek coveralls and Saranex Tyveks (Sarans) (PVC acid gear will be required when workers have a potential to be exposed to contaminated liquids or sludges.)
- Hard hat
- Steel-toed work boots
- Nitrile, neoprene, or PVC overboots
- Nitrile, neoprene, or PVC gloves over latex sample gloves

- Face shield (when projectiles or splashes pose a hazard)

5.2.4 Level B

Level B protection consists of the items required for Level C protection with the exception that an air-supplied respirator is used in place of the air-purifying respirator.

5.2.5 Level A

Level A protection consists of the items required for Level B protection with the addition of a fully-encapsulating, vapor-proof suit capable of maintaining positive pressure.

5.3 SUPPLIED-AIR RESPIRATORS

If air monitoring shows that Level B protection is needed, OHM personnel will wear Survivair 9881-02 Hippack Airline respirators with 5-minute egress bottles. Personnel requiring Level "B" protection and high mobility will wear Survivair Mark 2 SCBA units.

5.4 BREATHING-AIR QUALITY

Code of Federal Regulations 29 CFR 1910.134 states breathing air will meet the requirement of the specification for Grade D breathing air as described in the ANSI/CGA Specification G-7.1-1989. OHM requires a certificate of analysis from vendors of breathing air in order to show that the air meets this standard.

5.5 AIR-PURIFYING RESPIRATORS

OHM's air-purifying respirators are the MSA "Ultra-Twin" full-face respirators.

5.6 RESPIRATOR CARTRIDGES

The crew members working in Level C will wear respirators equipped with MSA GMC-H air-purifying cartridges, unless otherwise noted. The GMC-H cartridge holds approval for:

- Organic vapors <1,000 ppm
- Chlorine gas <10 ppm
- Hydrogen chloride <50 ppm
- Sulfur dioxide <50 ppm
- Dusts, fumes and mists with a TWA <0.05 mg/m³
- Asbestos-containing dusts and mists
- Radon daughters
- Radionuclides
- Pesticides

5.7 CARTRIDGE CHANGES

All cartridges will be changed a minimum of once daily. However, water saturation of the HEPA filter or dusty conditions may necessitate more frequent changes. Changes will occur when personnel begin to experience increased inhalation resistance or breakthrough of a chemical warning property.

5.8 INSPECTION AND CLEANING

Respirators are checked periodically by a qualified individual and inspected before each use by the wearer. All respirators and associated equipment will be decontaminated and hygienically cleaned after use.

5.9 FIT TESTING

Annual respirator fit tests are required of all personnel wearing negative-pressure respirators. The test will use isoamyl acetate or irritant smoke. The fit test must be for the style and size of the respirator to be used.

5.10 FACIAL HAIR

No personnel who have facial hair which interferes with the respirator's sealing surface will be permitted to wear a respirator and will not be permitted to work in areas requiring respirator use.

5.11 CORRECTIVE LENSES

Normal eyeglasses cannot be worn under full-face respirators because the temple bars interfere with the respirator's sealing surfaces. For workers requiring corrective lenses, special spectacles designed for use with respirators will be provided.

5.12 CONTACT LENSES

Contact lenses will not be worn with any type of respirator.

5.13 MEDICAL CERTIFICATION

Only workers who have been certified by a physician as being physically capable of respirator usage will be issued a respirator. Personnel unable to pass a respiratory fit test or without medical clearance for respirator use will not be permitted to enter or work in areas on site that require respiratory protection. Employees receive a written physicians opinion that they are fit for general hazardous waste operations as per 29 CFR 1910.120(f)(7).



5.14 SITE-SPECIFIC RESPIRATORY PROTECTION PROGRAM

The OHM Respiratory Protection Program complies with 29 CFR 1910.134. The primary objective of respiratory protection is to prevent atmospheric contamination. When engineering measures to control contamination are not feasible, or while they are being implemented, personal respiratory protective devices will be used.

The criteria for determining respirator need are contained in Section 7.0 of this HASP. The GMC-H cartridges will protect employees from the hazardous substances specific to this site. All respirator users are OSHA trained in proper respirator use and maintenance. The SS and SSO will observe workers during respirator use for signs of stress and will monitor air levels of contaminants to ensure that respiratory protection is sufficient. The SS, CIH, and SSO will also evaluate this HASP weekly to determine its continued effectiveness.

All respirators and cartridges used will provide adequate protection against the hazards for which they were designed in accordance with applicable standards. All persons assigned to use respirators will have medical clearance to do so.

SECTION 6.0

DECONTAMINATION PROCEDURES

This section describes the procedures necessary to ensure that both personnel and equipment are free from contamination when they leave the work site.

6.1 PERSONNEL DECONTAMINATION

Decontamination procedures will ensure that material which workers may have contacted in the EZ does not result in personal exposure and is not spread to clean areas of the site. This sequence describes the general decontamination procedure. The specific stages will vary depending on the site, the task, the protection level, etc.

1. Go to end of EZ
2. Wash outer boots and gloves in detergent solution
3. Rinse outer boots and gloves in water
4. Remove outer boots and let dry
5. Remove outer gloves and let dry
6. Cross into CRZ
7. Wash splash suit
8. Rinse splash suit
9. Remove splash suit and let dry
10. Remove Saranex Tyvek suit and discard
11. Remove sample gloves and discard
12. Remove and wash respirator
13. Rinse respirator and hang to dry
14. Remove sample gloves and discard
15. Remove Tyvek and discard
16. Remove booties and discard
17. Remove sample gloves and discard

6.1.1 Suspected Contamination

Any employee suspected of sustaining skin contact with chemical materials will first use the emergency shower. Following a thorough drenching, the worker will proceed to the decontamination facility. Here the worker will remove clothing, shower, don clean clothing, and immediately be taken to the first-aid station.

6.1.2 Personal Hygiene

Before any eating, smoking, or drinking, personnel will wash hands, arms, neck and face.

6.2 EQUIPMENT DECONTAMINATION

All contaminated equipment will be decontaminated before leaving the site. Decontamination procedures will vary depending upon the contaminant involved, but may include sweeping, wiping, scraping, hosing, or steaming the exterior of the equipment. Personnel performing this task will wear the proper PPE as prescribed by the SSO.

6.3 DISPOSAL

All liquids and disposable clothing will be treated as contaminated waste and disposed of properly.

SECTION 7.0 AIR MONITORING

Air monitoring will be conducted in order to determine airborne contamination levels. This ensures that respiratory protection is adequate to protect personnel against the chemicals that are encountered. The following air monitoring efforts will be used at this site. Additional air monitoring may be conducted at the discretion of the SSO.

The following chart describes the air monitoring required and appropriate action levels.

<i>Monitoring Device</i>	<i>Action Level</i>	<i>Action</i>
LEL/O ₂	> 10% LEL < 20.8% O ₂	Evacuate area, ventilate, upgrade to Level B if necessary, continue to monitor
PID	1-5 ppm unknowns 5-500 ppm unknowns > 500 ppm unknowns	Level C Level B Level A

7.1 LOWER EXPLOSIVE LIMIT/OXYGEN (LEL/O₂) METER

Prior to entering a confined-space area or hot work involving welding, cutting, or other high heat-producing operations where flammable or combustible vapors may be present, LEL/O₂ measurements will be taken.

7.2 PHOTOIONIZATION DETECTOR (PID)

A PID will be used to monitor total ionizable organic content of the ambient air. A PID will prove useful as a direct reading instrument to aid in determining if respiratory protection needs to be upgraded and to define the EZ.

For known contaminants only, to determine a protection level from PID data, the SSO will multiply the TLV of the known compound by 25. This is the limit for Level C protection for that compound. If PID readings exceed 25 times the TLV, Level B protection will be required. Also, regardless of the TLV, a PID reading of 1,000 ppm or more will indicate that the GMC-H cartridges may become overloaded and will necessitate Level B protection. (Note: PID readings do not always indicate the actual air concentration of a compound. Consult the manual, HNU, or the CIH for clarification.)

The SSO will take measurements before operations begin in an area to determine the amount of organic compounds naturally occurring in the air. This is referred to as a background level.

Levels of volatile organic compounds will be measured in the air at active work sites once every hour and at the support zone once every hour when levels are detected above background in the exclusion zone. If levels exceed background at any time in the support zone, work in the exclusion zone will cease and corrective actions will be taken, e.g., cover soil with polyethylene sheeting, applying vapor-suppressing foam to soil. Work will not resume until levels are below background in the support zone.

7.3 AIR MONITORING LOG

The SSO will ensure that all air-monitoring data is logged into a monitoring notebook. Data will include instrument used, wind direction, work process, etc. The Regional and Corporate OHM CIH will periodically review this data.

7.4 CALIBRATION REQUIREMENTS

The PID, LEL/O₂ meter and sampling pumps required with fixed-media air sampling will be calibrated daily prior to use. A separate log will be kept detailing date, time, span gas, or other standard, and name of person performing the calibration.

7.5 AIR MONITORING RESULTS

Air monitoring results will be posted for personnel inspection, and will be discussed during morning safety meetings.

SECTION 8.0

EMERGENCY RESPONSE AND CONTINGENCY PLAN

8.1 PRE-EMERGENCY PLANNING

Prior to engaging in construction/remediation activities at the site, OHM will plan for possible emergency situations and have available adequate supplies and manpower to respond. In addition site personnel will receive training during the site orientation concerning proper emergency response procedures.

The following situations would warrant implementation of the ERCP:

Fire/Explosion	<ul style="list-style-type: none">• The potential for human injury exists.• Toxic fumes or vapors are released.• The fire could spread on site or off site and possibly ignite other flammable materials or cause heat-induced explosions.• The use of water and/or chemical fire suppressants could result in contaminated run-off.• An imminent danger of explosion exists.
Spill or Release of Hazardous Materials	<ul style="list-style-type: none">• The spill could result in the release of flammable liquids or vapors, thus causing a fire or gas explosion hazard.• The spill could cause the release of toxic liquids or fumes in sufficient quantities or in a manner that is hazardous to or could endanger human health.
Spill or Release of High Temperature Liquid or Vapor	<ul style="list-style-type: none">• The spill can be contained on site, but the potential exists for ground-water contamination.• The spill cannot be contained on site, resulting in off-site soil contamination and/or ground-water or surface water pollution.• The spill quantity is greater than the reportable quantity limit for the material.
Natural Disaster	<ul style="list-style-type: none">• A rain storm exceeds the flash flood level.• The facility is in a projected tornado path or a tornado has damaged facility property.• Severe wind gusts are forecasted or have occurred and have caused damage to the facility.
Medical Emergency	<ul style="list-style-type: none">• Overexposure to hazardous materials.• Trauma injuries (broken bones, severe lacerations/bleeding, burns).• Eye/skin contact with hazardous materials.• Loss of consciousness.• Heat stress (Heat stroke).• Cold stress (Hypothermia).• Heart attack.• Respiratory failure.• Allergic reaction.

The following measures will be taken to assure the availability of adequate equipment and manpower resources:

- Sufficient equipment and materials will be kept on site and dedicated for emergencies only. The inventory will be replenished after each use.
- On-site emergency responders will be current in regards to training and medical surveillance programs. Copies of all applicable certificates will be kept on file for on-site personnel required to respond.
- It will be the responsibility of the emergency coordinator to brief the on-site response team on anticipated hazards at the site. The emergency coordinator shall also be responsible for anticipating and requesting equipment that will be needed for response activities.
- Emergency response activities will be coordinated with the Local Emergency Planning Committee (LEPC) in compliance with SARA Title III requirements.

Communications will be established prior to commencement of any activities at the remediation site. Communication will be established so that all responders on site have availability to all pertinent information to allow them to conduct their activities in a safe and healthful manner. The primary communication device will be two-way radios. Air horns may be used to alert personnel of emergency conditions.

Primary communication with local responders in the event of an emergency will be accomplished using commercial telephone lines.

8.2 EMERGENCY RECOGNITION AND PREVENTION

Because unrecognized hazards may result in emergency incidents, it will be the responsibility of the Site Supervisor and Site Safety Officer (SSO), through daily site inspections and employee feedback (Safety Observation Program, daily safety meetings, and activity hazard analyses) to recognize and identify all hazards that are found at the site. These may include:

Chemical Hazards	<ul style="list-style-type: none"> • Materials at the site • Materials brought to the site
Physical Hazards	<ul style="list-style-type: none"> • Fire/explosion • Slip/trip/fall • Electrocuting • Confined space • IDLH atmospheres • Excessive noise
Mechanical Hazards	<ul style="list-style-type: none"> • Heavy equipment • Stored energy system • Pinch points • Electrical equipment • Vehicle traffic
Environmental Hazards	<ul style="list-style-type: none"> • Electrical Storms • High winds • Heavy Rain/Snow • Temperature Extremes (Heat/Cold Stress) • Poisonous Plants/Animals

EMERGENCY RESPONSE AND CONTINGENCY PLAN

Once a hazard has been recognized, the Site Supervisor and/or the SSO will take immediate action to prevent the hazard from becoming an emergency. This may be accomplished by the following:

- Daily safety meeting
- Task-specific training prior to commencement of activity
- Lock-out/tag-out
- Personal Protective Equipment (PPE) selection/use
- Written and approved permits for hot work, confined space
- Trenching/shoring procedure
- Air monitoring
- Following all OHM standard operating procedures
- Practice drills for fire, medical emergency, and hazardous substances spills

TABLE 8.1

EMERGENCY TELEPHONE NUMBERS

<u>Local Agencies</u>	
Fire Department	9-1-1
Police	716-661-7092
Ambulance	716-644-3100
Hospital - WCA Hospital	716-487-0141
207 Foote Avenue, Jamestown, NY 14701	
Left from parking lot to West Lister Av; left on	
Rt 394; two (2) miles into Jamestown to Foote st;	
left on Foote to Hospital (207 Foote)	
Regional Poison Control Center	800-333-0542 - Rochester
	800-252-5655 - Syracuse
<u>State Agencies</u>	
New York State Dept of Environmental	800-457-7362
Conservation (24 Hour)	
<u>Federal Agencies</u>	
EPA Region Branch Response Center	908-548-8730
Weston TAT Office	908-225-6116
National Response Center	800-424-8802
ERCS Program Manager Tom O'Hara	609-588-6395
Director, Health and Safety	609-588-6375
Kevin McMahon	
OHM Corporation (24 hour)	800-537-9540
Additional Phone #'s in Section 2 this HASP	



EMERGENCY RESPONSE AND CONTINGENCY PLAN

8.3 PERSONNEL ROLES, LINES OF AUTHORITY, AND COMMUNICATIONS

This section of the ERCP describes the various roles, responsibilities, and communication procedures that will be followed by personnel involved in emergency responses.

The primary emergency coordinator for this site is the Site Supervisor. In the event an emergency occurs and the emergency coordinator is not on site, the Site Safety Officer or the highest ranking employee on site will serve as the emergency coordinator until he arrives. The emergency coordinator will determine the nature of the emergency and take appropriate action as defined by this ERCP.

The emergency coordinator will implement the ERCP immediately as required. The decision to implement the plan will depend upon whether the actual incident threatens human health or the environment. Immediately after being notified of an emergency incident, the emergency coordinator or his designee will evaluate the situation to determine the appropriate action.

8.3.1 Responsibilities and Duties

This section describes the responsibilities and duties assigned to the emergency coordinator.

It is recognized that the structure of the "Incident Command System" will change as additional response organizations are added. OHM will follow procedures as directed by the fire department, LEPC, State and Federal Agencies as required. OHM will defer to the local Fire Department chief to assume the role of Incident Commander upon arriving on site. Additional on-site personnel may be added to the Site Emergency Response Team as required to respond effectively.

8.3.2 On-site Emergency Coordinator Duties

The on-site emergency coordinator is responsible for implementing and directing the emergency procedures. All emergency personnel and their communications will be coordinated through the emergency coordinator. Specific duties are as follows:

- Identify the source and character of the incident, type and quantity of any release. Assess possible hazards to human health or the environment that may result directly from the problem or its control.
- Discontinue operations in the vicinity of the incident if necessary to ensure that fires, explosions, or spills do not recur or spread to other parts of the site. While operations are dormant, monitor for leaks, pressure build-up, gas generation, or ruptures in valves, pipes, or other equipment, where appropriate.
- Notify local Emergency Response Teams if their help is necessary to control the incident. Table 8.1 provides telephone numbers for emergency assistance.
- Direct on-site personnel to control the incident until, if necessary, outside help arrives. Specifically:
- Ensure that the building or area where the incident occurred and the surrounding area are evacuated and shut off possible ignition sources, if appropriate. The Emergency Response Team is responsible for directing site personnel such that they avoid the area of the incident and leave emergency control procedures unobstructed.



EMERGENCY RESPONSE AND CONTINGENCY PLAN

- If fire or explosion is involved, notify local Fire Department.
- Have protected personnel, in appropriate PPE, on standby for rescue.

If the incident may threaten human health or the environment outside of the site, the emergency coordinator should immediately determine whether evacuation of area outside of the site may be necessary and, if so, notify the Police Department and the Office of Emergency Management.

When required, notify the National Response Center. The following information should be provided to the National Response Center:

- Name and telephone number
- Name and address of facility
- Time and type of incident
- Name and quantity of materials involved, if known
- Extent of injuries
- Possible hazards to human health or the environment outside of the facility.

The emergency telephone number for the National Response Center is 800-424-8802.

If hazardous waste has been released or produced through control of the incident, ensure that:

- Waste is collected and contained.
- Containers of waste are removed or isolated from the immediate site of the emergency.
- Treatment or storage of the recovered waste, contaminated soil or surface water, or any other material that results from the incident or its control is provided.
- Ensure that no waste that is incompatible with released material is treated or stored in the facility until cleanup procedures are completed.
- Ensure that all emergency equipment used is decontaminated, recharged, and fit for its intended use before operations are resumed.
- Notify the USEPA Regional Administrator that cleanup procedures have been completed and that all emergency equipment is fit for its intended use before resuming operations in the affected area of the facility. The USEPA Regional Administrator's telephone number is included in the Emergency Contacts.
- Record time, date, and details of the incident, and submit a written report to the USEPA Regional Administrator. Report is due to USEPA within 15 days of the incident.

8.4 SAFE DISTANCES AND PLACES OF REFUGE

The emergency coordinator for all activities will be the Response Manager. No single recommendation can be made for evacuation or safe distances because of the wide variety of emergencies which could occur. Safe distances can only be determined at the time of an emergency based on a combination of site and incident-specific criteria. However, the following measures are established to serve as general guidelines.

EMERGENCY RESPONSE AND CONTINGENCY PLAN

In the event of minor hazardous materials releases (small spills of low toxicity), workers in the affected area will report initially to the contamination reduction zone. Small spills or leaks (generally less than 55 gallons) will require initial evacuation of at least 50 feet in all directions to allow for cleanup and to prevent exposure. After initial assessment of the extent of the release and potential hazards, the emergency coordinator or his designee will determine the specific boundaries for evacuation. Appropriate steps such as caution tape, rope, traffic cones, barricades, or personal monitors will be used to secure the boundaries.

In the event of a major hazardous material release (large spills of high toxicity/greater than 55 gallons), workers will be evacuated from the building/site. Workers will assemble at the entrance to the site for a head count by their foremen and to await further instruction.

If an incident may threaten the health or safety of the surrounding community, the public will be informed and, if necessary, evacuated from the area. The emergency coordinator, or his designee will inform the proper agencies in the event that this is necessary. Telephone numbers are listed in Table 8.1.

Places of refuge will be established prior to the commencement of activities. These areas must be identified for the following incidents:

- Chemical release
- Fire/explosion
- Power loss
- Medical emergency
- Hazardous weather

In general, evacuation will be made to the crew trailers, unless the emergency coordinator determines otherwise. It is the responsibility of the emergency coordinator to determine when it is necessary to evacuate personnel to off-site locations.

In the event of an emergency evacuation, all the employees will gather at the entrance to the site until a head count establishes that all are present and accounted for. No one is to leave the site without notifying the emergency coordinator.

8.5 EVACUATION ROUTES AND PROCEDURES

All emergencies require prompt and deliberate action. In the event of an emergency, it will be necessary to follow an established set of procedures. Such established procedures will be followed as closely as possible. However, in specific emergency situations, the emergency coordinator may deviate from the procedures to provide a more effective plan for bringing the situation under control. The emergency coordinator is responsible for determining which situations require site evacuation.

8.5.1 Evacuation Signals and Routes

Two-way radio communication and an air horn will be used to notify employees of the necessity to evacuate an area or building involved in a release/spill of a hazardous material. Each crew supervisor will have a two way radio. A base station will be installed in the OHM office trailer to monitor for emergencies. Total site evacuation will be initiated only by the emergency coordinator, however, in his absence, decision to preserve the health and safety of employees will take precedence. Evacuation routes will be posted in each outside work area. Signs inside buildings will be posted on walls or other structural element of a building. Periodic drills will be conducted to familiarize each employee with the proper routes and procedures.



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8.5.2 Evacuation Procedures

In the event evacuation is necessary, the following actions will be taken:

- The emergency signal will be activated.
- No further entry of visitors, contractors, or trucks will be permitted. Vehicle traffic within the site will cease in order to allow safe exit of personnel and movement of emergency equipment.
- Shut off all machinery if safe to do so.
- ALL on-site personnel, visitors, and contractors in the support zone will assemble at the entrance to the site for a head count and await further instruction from the emergency coordinator.
- ALL persons in the exclusion zone and contamination reduction zone will be accounted for by their immediate crew leaders (e.g., foreman). Leaders will determine the safest exits for employees and will also choose an alternate exit if the first choice is inaccessible.
- During exit, the crew leader should try to keep the group together. Immediately upon exit, the crew leader will account for all employees in his crew.
- Upon completion of the head count, the crew leader will provide the information to the emergency coordinator.
- Contract personnel and visitors will also be accounted for.
- The names of emergency response team members involved will be reported to the emergency spill control coordinator.
- A final tally of persons will be made by the emergency coordinator or designee. No attempt to find persons not accounted for will involve endangering lives of OHM or other employees by re-entry into emergency areas.
- In all questions of accountability, immediate crew leaders will be held responsible for those persons reporting to them. Visitors will be the responsibility of those employees they are seeing. Contractors and truck drivers are the responsibility of the Site Supervisor. The security guard will aid in accounting for visitors, contractors, and truckers by reference to sign-in sheets available from the guard shack.
- Personnel will be assigned by the emergency coordinator to be available at the main gate to direct and brief emergency responders.
- Re-entry into the site will be made only after clearance is given by the emergency coordinator. At his direction, a signal or other notification will be given for re-entry into the facility.
- Drills will be held periodically to practice all of these procedures and will be treated with the same seriousness as an actual emergency.



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8.6 EMERGENCY SPILL RESPONSE PROCEDURES AND EQUIPMENT

In the event of an emergency involving a hazardous material spill or release, the following general procedures will be used for rapid and safe response and control of the situation. Emergency contacts found in Table 8.1 provide a quick reference guide to follow in the event of a major spill.

8.6.1 Notification Procedures

If an employee discovers a chemical spill or process upset resulting in a vapor or material release, he or she will immediately notify the on-site emergency coordinator.

On-site Emergency Coordinator will obtain information pertaining to the following:

- The material spilled or released.
- Location of the release or spillage of hazardous material.
- An estimate of quantity released and the rate at which it is being released.
- The direction in which the spill, vapor or smoke release is heading.
- Any injuries involved.
- Fire and/or explosion or possibility of these events.
- The area and materials involved and the intensity of the fire or explosion.

This information will help the on-site emergency coordinator to assess the magnitude and potential seriousness of the spill or release.

8.6.2 Procedure for Containing/Collecting Spills

The initial response to any spill or discharge will be to protect human health and safety, and then the environment. Identification, containment, treatment, and disposal assessment will be the secondary response.

If for some reason a chemical spill is not contained within a dike or sump area, an area of isolation will be established around the spill. The size of the area will generally depend on the size of the spill and the materials involved. If the spill is large (greater than 55 gallons) and involves a tank or a pipeline rupture, an initial isolation of at least 100 ft. in all directions will be used. Small spills (less than or equal to 55 gallons) or leaks from a tank or pipe will require evacuation of at least 50 ft. in all directions to allow cleanup and repair and to prevent exposure. When any spill occurs, only those persons involved in overseeing or performing emergency operations will be allowed within the designated hazard area. If possible the area will be roped or otherwise blocked off.

If the spill results in the formation of a toxic vapor cloud (by reaction with surrounding materials or by outbreak of fire) and its release (due to high vapor pressures under ambient conditions), further evacuation will be enforced. In general an area at least 500 feet wide and 1,000 feet long will be evacuated downwind if volatile materials are spilled. (Consult the DOT Emergency Response Guide for isolation distances for listed hazardous materials.)

If an incident may threaten the health or safety of the surrounding community, the public will be informed and possibly evacuated from the area. The on-site emergency coordinator will inform the proper agencies in the event this is necessary. (Refer to Table 8.1)



EMERGENCY RESPONSE AND CONTINGENCY PLAN

As called for in regulations developed under the Comprehensive Environmental Response Compensation Liability Act of 1980 (Superfund), OHM's practice is to report a spill of a pound or more of any hazardous material for which a reportable quantity has not been established and which is listed under the Solid Waste Disposal Act, Clean Air Act, Clean Water Act, or TSCA. OHM also follows the same practice for any substances not listed in the Acts noted above but which can be classified as a hazardous waste under RCRA.

Clean up personnel will take the following measures:

- Make sure all unnecessary persons are removed from the hazard area.
- Put on protective clothing and equipment.
- If a flammable material is involved, remove all ignition sources, and use spark and explosion proof equipment for recovery of material.
- Remove all surrounding materials that could be especially reactive with materials in the waste. Determine the major components in the waste at the time of the spill.
- If wastes reach a storm sewer, try to dam the outfall by using sand, earth, sandbags, etc. If this is done, pump this material out into a temporary holding tank or drums as soon as possible.
- Place all small quantities of recovered liquid wastes (55 gallons or less) and contaminated soil into drums for incineration or removal to an approved disposal site.
- Spray the spill area with foam, if available, if volatile emissions may occur.
- Apply appropriate spill control media (e.g. clay, sand, lime, etc.) to absorb discharged liquids.
- For large spills, establish diking around leading edge of spill using booms, sand, clay or other appropriate material. If possible, use diaphragm pump to transfer discharged liquid to drums or holding tank.

8.6.3 Emergency Response Equipment

The following equipment will be staged in the support zone and throughout the site, as needed, to provide for safety and first aid during emergency responses.

- ABC-type fire extinguisher
- First-aid kit, industrial size
- Eyewash/safety shower
- Emergency oxygen unit
- Emergency signal horn
- Self contained breathing apparatus (two)
- Stretcher/backboard



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In addition to the equipment listed above, OHM maintains direct reading instrumentation that may be used in emergency situations to assess the degree of environmental hazard. This equipment will only be used by the Site Safety Officer or other specially trained personnel. This equipment will be stored, charged and ready for immediate use in evaluating hazardous chemical concentrations. The equipment will be located at the OHM office trailer.

<i>EQUIPMENT NAME</i>	<i>APPLICATION</i>
Portable H-NU Photoionization Meter	Measures selected inorganic and organic chemical concentrations
MSA Oxygen and Combustible Gas Meter	Measures oxygen and combustible gas levels
Draeger Detector Tubes	Assorted detector tubes to measure specific chemical concentrations

8.6.4 Personal Protective Equipment

A supply of two (minimum) SCBAs will be located in the support zone for use in emergency response to hazardous materials releases. They will be inspected at least monthly, according to OSHA requirements. In addition, all emergency response personnel will have respirators available for use with cartridge selection determined by the Site Safety Officer based on the results of direct reading instruments. Emergency response personnel will also be provided with protective clothing as warranted by the nature of the hazardous material and as directed by the Site Safety Officer.

8.6.5 Emergency Spill Response Clean-Up Materials and Equipment

A sufficient supply of appropriate emergency response clean-up and personal protective equipment will be inventoried and inspected, visually, on a weekly basis.

The materials listed below will be kept on site for spill control, depending on the types of hazardous materials present on site. The majority of this material will be located in the support zone, in a supply trailer or storage area. Small amounts will be placed on pallets and located in the active work areas:

- Sand or clay to solidify/absorb liquid spills.
- Lime (calcium oxide), soda ash (sodium carbonate), or baking soda (sodium bicarbonate) for neutralizing acid (pH < 7) spills.
- Activated charcoal (carbon) to adsorb organic solvents (hydrocarbons) and to reduce flammable vapors.
- Citric acid for neutralizing caustic (pH > 7) spills.
- Vapor-suppressing foam, if required by the Client, for controlling the release of volatile organic compounds.
- Appropriate solvents e.g. CITRIKLEEN, for decontamination of structures or equipment.



EMERGENCY RESPONSE AND CONTINGENCY PLAN

The following equipment will be kept on site and dedicated for spill cleanup:

- Plastic shovels for recovering corrosive and flammable materials.
- Sausage-shaped absorbent booms for diking liquid spills, drains, or sewers.
- Sorbent sheets (diapers) for absorbing liquid spills.
- Overpack drums for containerizing leaking drums.
- 55-gallon open-top drums for containerization of waste materials.

*NOTE: All contaminated soils, absorbent materials, solvents and other materials resulting from the clean-up of spilled or discharged substances shall be properly stored, labelled, and disposed of off-site.

8.7 EMERGENCY CONTINGENCY PLAN

This section of the ERCP details the contingency measures OHM will take to prepare for and respond to fires, explosions, spills and releases of hazardous materials, hazardous weather, and medical emergencies.

8.8 MEDICAL EMERGENCY CONTINGENCY MEASURES

The procedures listed below will be used to respond to medical emergencies.

8.8.1 Response

The nearest workers will immediately assist a person who shows signs of medical distress or who is involved in an accident. The work crew supervisor will be summoned.

The work crew supervisor will immediately make radio contact with the on-site emergency coordinator to alert him of a medical emergency situation. The supervisor will advise the following information:

- Location of the victim at the work site
- Nature of the emergency
- Whether the victim is conscious
- Specific conditions contributing to the emergency, if known

The Emergency Coordinator will notify the Site Safety Officer. The following actions will then be taken depending on the severity of the incident:

- Life-Threatening Incident--If an apparent life-threatening condition exists, the crew supervisor will inform the emergency coordinator by radio, and the local Emergency Response Services (EMS) will be immediately called. An on-site person will be appointed who will meet the EMS and have him/her quickly taken to the victim.



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- **Non Life-Threatening Incident**—If it is determined that no threat to life is present, the Site Safety Officer will direct the injured person through decontamination procedures (see below) appropriate to the nature of the illness or accident. Appropriate first aid or medical attention will then be administered.

***NOTE:** The area surrounding an accident site must not be disturbed until the scene has been cleared by the Site Safety Officer.

Any personnel requiring emergency medical attention will be evacuated from exclusion and contamination reduction zones if doing so would not endanger the life of the injured person or otherwise aggravate the injury. Personnel will not enter the area to attempt a rescue if their own lives would be threatened. The decision whether or not to decontaminate a victim prior to evacuation is based on the type and severity of the illness or injury and the nature of the contaminant. For some emergency victims, immediate decontamination may be an essential part of life-saving first aid. For others, decontamination may aggravate the injury or delay life-saving first aid. Decontamination will be performed if it does not interfere with essential treatment.

If decontamination can be performed, observe the following procedures:

- Wash external clothing and cut it away.

If decontamination cannot be performed, observe the following procedures:

- Wrap the victim in blankets or plastic to reduce contamination of other personnel.
- Alert emergency and off-site medical personnel to potential contamination, instruct them about specific decontamination procedures.
- Send site personnel familiar with the incident and chemical safety information, e.g. MSDS, with the affected person.

All injuries, no matter how small, will be reported to the SSO or the Site Supervisor. An accident/injury/illness report will be completely and properly filled out and submitted to the Regional Health and Safety Director/Project CIH, in accordance with OHM's reporting procedures.

A list of emergency telephone numbers is given in Table 8.1.

8.8.2 Notification

The following personnel/agencies will be notified in the event of a medical emergency:

- Local Fire Department or EMS
- On-site Emergency Coordinator
- Workers in the affected areas
- Client Representative



EMERGENCY RESPONSE AND CONTINGENCY PLAN

8.8.3 Directions To Hospital

Written directions to the hospital and a map will be posted in all trailers in the staging area. Directions to the hospital are as follows:

Left from parking lot to West Lister Av; left on
Rt 394; two (2) miles into Jamestown to Foote st; left on Foote to Hospital (207 Foote)

8.9 FIRE CONTINGENCY MEASURES

Because flammable/combustible materials are present at this site, fire is an ever-present hazard. OHM personnel and subcontractors are not trained professional firefighters. Therefore, if there is any doubt that a fire can be quickly contained and extinguished, personnel will notify the emergency coordinator by radio and vacate the structure or area. The emergency coordinator will immediately notify the local Fire Department.

The following procedures will be used to prevent the possibility of fires and resulting injuries:

- Sources of ignition will be kept away from where flammable materials are handled or stored.
- The air will be monitored for explosivity before and during hot work and periodically where flammable materials are present. Hot work permits will be required for all such work.
- "No smoking" signs will be conspicuously posted in areas where flammable materials are present.
- Fire extinguishers will be placed in all areas where a fire hazard may exist.
- Before workers begin operations in an area the foreman will give instruction on egress procedures and assembly points. Egress routes will be posted in work areas and exit points clearly marked.

8.9.1 Response

The following procedures will be used in the event of a fire:

- Anyone who sees a fire will notify their supervisor who will then contact the Emergency Coordinator by radio. The emergency coordinator will activate the emergency air horns and contact the local Fire Department.
- When the emergency siren sounds, workers will disconnect electrical equipment in use (if possible) and proceed to the nearest fire exit.
- Work crews will be comprised of pairs of workers (buddy system) who join each other immediately after hearing the fire alarm and remain together throughout the emergency. Workers will assemble at a predetermined rally point for a head count.
- When a small fire has been extinguished by a worker, the emergency coordinator will be notified.



EMERGENCY RESPONSE AND CONTINGENCY PLAN

8.10 HAZARDOUS WEATHER CONTINGENCY MEASURES

Operations will not be started or continued when the following hazardous weather conditions are present:

- Lightning
- Heavy Rains/Snow
- High Winds

8.10.1 Response

- Excavation/soil stock piles will be covered with plastic liner.
- All equipment will be shut down and secured to prevent damage.
- Personnel will be moved to safe refuge, initially crew trailers. The emergency coordinator will determine when it is necessary to evacuate personnel to off-site locations and will coordinate efforts with fire, police and other agencies.

8.10.2 Notification

The emergency coordinator will be responsible for assessing hazardous weather conditions and notifying personnel of specific contingency measures. Notifications will include:

- OHM employees and subcontractors
- Client Representative
- Local Civil Defense Organization

8.11 SPILL/RELEASE CONTINGENCY MEASURES

In the event of release or spill of a hazardous material the following measures will be taken:

8.11.1 Response

Any person observing a spill or release will act to remove and/or protect injured/contaminated persons from any life-threatening situation. First aid and/or decontamination procedures will be implemented as appropriate. First aid will be administered to injured/contaminated personnel. Unsuspecting persons/vehicles will be warned of the hazard. All personnel will act to prevent any unsuspecting persons from coming in contact with spilled materials by alerting other nearby persons. Attempt to stop the spill at the source, if possible. Without taking unnecessary risks, personnel will attempt to stop the spill at the source. This may involve activities such as uprighting a drum, closing a valve or temporarily sealing a hole with a plug.



EMERGENCY RESPONSE AND CONTINGENCY PLAN

Utilizing radio communications, the emergency coordinator will be notified of the spill/release, including information on material spilled, quantity, personnel injuries and immediate life threatening hazards. Air monitoring will be implemented by the emergency coordinator and SSO to determine the potential impact on the surrounding community. Notification procedures will be followed to inform on-site personnel and off-site agencies. The emergency coordinator will make a rapid assessment of the spill/release and direct confinement, containment and control measures. Depending upon the nature of the spill, measures may include:

- Construction of a temporary containment berm utilizing on-site clay absorbent earth
- Digging a sump, installing a polyethylene liner and
- Diverting the spill material into the sump placing drums under the leak to collect the spilling material before it flows over the ground
- Transferring the material from its original container to another container

The emergency coordinator will notify the Client Representative of the spill and steps taken to institute clean-up. Emergency response personnel will clean-up all spills following the spill clean-up plan developed by the emergency coordinator. Supplies necessary to clean up a spill will be immediately available on-site. Such items may include, but are not limited to:

- Shovel, rake
- Clay absorbent
- Polyethylene liner
- Personal safety equipment
- Steel drums
- Pumps and miscellaneous hand tools

The major supply of material and equipment will be located in the Support Zone. Smaller supplies will be kept at active work locations. The emergency coordinator will inspect the spill site to determine that the spill has been cleaned up to the satisfaction of the Client. If necessary, soil, water or air samples may be taken and analyzed to demonstrate the effectiveness of the spill clean-up effort. The emergency coordinator will determine the cause of the spill and determine remedial steps to ensure that recurrence is prevented. The emergency coordinator will review the cause with the Client Representative and obtain his concurrence with the remedial action plan.

SECTION 9.0 TRAINING REQUIREMENTS

As a prerequisite to employment at OHM, all field employees are required to take a 40-hour training class and pass a written examination. This training covers all forms of personal protective equipment, toxicological effects of various chemicals, handling of unknown tanks and drums confined-space entry procedures, and electrical safety. This course is in full compliance with OSHA requirements in 29 CFR 1910.120. In addition, all employees receive annual 8-hour refresher training and supervisory personnel receive an additional 8-hour training in handling hazardous waste operations.

All personnel entering the exclusion zone will be trained in the provisions of this site safety plan and be required to sign the Site Safety Plan Acknowledgment in Appendix A.

SECTION 10.0 MEDICAL SURVEILLANCE PROGRAM

All OHM personnel participate in a medical and health monitoring program. This program is initiated when the employee starts work with a complete physical and medical history and is continued on a regular basis. A listing of OHM's worker medical profile is shown below. This program was developed in conjunction with a consultant toxicologist. Other medical consultants are retained when additional expertise is required.

The medical surveillance program meets the requirements of the OSHA Standard 29 CFR 1910.120 (f).

TABLE 10.1
WORKER MEDICAL PROFILE

<i>Item</i>	<i>Initial</i>	<i>Annual</i>
Medical History	X	X
Work History	X	X
Visual Acuity and Tonometry	X	X
Pulmonary Function Tests	X	X
Physical Examination	X	X
Audiometry Tests	X	X
Chest X-Ray	X	X
Complete Blood Counts	X	X
Blood Chem. (SSAC-23 or equivalent)	X	X
Urinalysis	X	X
Dermatology Examination	X	X
Electrocardiogram/Stress Test	X	X (based on age)

Specific Tests (as required):

(PCB blood or fat, urine mercury, urine arsenic, urine phenol, urine halomethanes, blood cyanide, cholinesterase-pseudo-cholinesterase, nerve conduction velocity tests, blood lead, urine lead.)

10.1 EXAMINATION SCHEDULE

Employees are examined initially upon start of employment, annually thereafter, and may be examined upon termination of employment. Unscheduled medical examinations are conducted:

- At employee request after known or suspected exposure to toxic or hazardous materials
- At the discretion of the client, the CIH, SSO, or OHM occupational physician after known or suspected exposure to toxic or hazardous materials
- At the discretion of the OHM occupational physician

All nonscheduled medical examinations will include, as a minimum, all items specified above for periodic surveillance examination, with the exception of the chest X-ray, which will be conducted at the discretion of the occupational physician performing the examination.

APPENDIX A

HEALTH AND SAFETY PLAN CERTIFICATION

By signing this document, I am stating that I have read and understand the site health-and-safety plan for OHM Remediation Services Corp. personnel and visitors entering the Chase Interiors site.

[illegible]

APPENDIX B

OHM HAZARD COMMUNICATION PROGRAM

APPENDIX B

OHM HAZARD COMMUNICATION PROGRAM

1.0 GENERAL

The following written hazard communication program has been established for OHM Corporation. The purpose of this program is to transmit information about the various Chemical hazards in the work place to the workers using various media. The transmittal of information will be accomplished by means of a comprehensive hazard communication program, which will include container labeling and other forms of warning, material safety data sheets, and employee training in accordance with 29 CFR 1910.1200 and 29 CFR 1926.59.

The program will be available in corporate and regional Health and Safety Departments for reviews by all employees. It will also be available in the corporate library and clearly marked "Employee Right-to-Know" stations located within each individual shop and on each job site. OHM Corporation will accomplish the hazard communication requirements through formal safety training, departmental safety meetings, and job site safety meetings.

2.0 RESPONSIBILITIES

Purpose: Overall responsibility rests with all corporate officers of OHM Corporation. A brief outline of responsibilities for those persons directly involved with the program will follow. These responsibilities are not all inclusive, but are designed to give guidance in initial and long-term program development since each area is different. These responsibilities may vary.

Scope: This program is intended to cover those employees who are directly involved with the handling of hazardous materials or supervision of those activities.

2.1 Health and Safety Department Responsibilities

1. Review operations with supervisors to determine what tasks require hazard communication training.
2. Advise supervisory people as to which materials may need to be considered hazardous initially and eventually to ensure that hazard task determination is being done according to the written policy.
3. Follow up through safety meetings and safety audits to ensure that supervisors are carrying out prescribed company policy.
4. Notify supervisors of any operating changes affecting the hazardous materials being used.
5. Periodically audit the Hazard Communication Program's progress. Initially, this should be done biweekly, but later the audit may be done on a monthly or quarterly basis.

2.2 Training Department Responsibilities

1. Ensure that up-to-date records are maintained on training of all employees required to handle hazardous materials. The supervisor should keep copies of these records and should also send copies of the initial training to the corporate training secretary for the training file.
2. Educate personnel upon initial training to the requirements of the Hazard Communication Standard.

2.3 Supervisor Responsibilities

1. Identify jobs requiring the use of hazardous chemicals and provide lists of those jobs and chemicals to the Health and Safety Department.
2. Provide the training required by the Hazard Communication Standard and document training of employees in the safe handling of hazardous materials.
3. Inspect engineering controls and personal protective equipment before each use. Health and Safety can help determine a suitable inspection plan for each application as needed.
4. Make daily surveys of the work area to ensure that safe practices are being followed. Advise employees of unsafe work practices on the first occasion and consider further violations as disciplinary violations.
5. Ensure required labeling practices are being followed. Labeling should be affixed to the container when it arrives. If the contents are transferred to another container, then all label information (manufacturer, product name, and product number) must also be affixed to the new container, so that all containers of the material, regardless of size, are labeled.
6. Enforce all applicable safety and health standards through periodic audits.
7. Before ordering a material, determine if a Material Safety Data Sheet exist on file. Request an MSDS for any material without one.
8. Send all new MSDSs to the Health and Safety Department after making a copy for the Employee Right-to-Know file.

2.4 Employee Responsibilities

1. Obey established safety rules and regulations
2. Use all safety procedures and personnel protective equipment as required by company procedures
3. Notify supervisor of the following:
 - a. Any symptoms or unusual effects that may be related to the use of hazardous chemicals.

- b. Any missing or unreadable labels on containers.
- c. Missing, damaged, or malfunctioning safety equipment.
- 4. Use approved labels on containers; do not remove labels (labels will be located in the warehouse).
- 5. Do not use unapproved containers for hazardous materials. (Is material and container compatible?)
- 6. Know where emergency equipment and first-aid supplies are located before considering a possibly dangerous task.
- 7. Know location of Material Safety Data Sheets (MSDS). These will be located in the "Employee Right-to-know" station for the respective shop/job site.
- 8. Know what you are expected to do in case of an emergency. Before the commencement of any task, emergency considerations shall be made.

2.5 Shipping/Receiving Personnel Responsibilities

- 1. Ensure MSDS are received with initial shipment of a hazardous material; if not, contact purchasing to request the appropriate MSDS and also call the Health and Safety Department to determine if there is an MSDS available until the requested MSDS arrives.
- 2. Ensure labels are affixed to all containers.
- 3. Store hazardous materials in designated locations.
- 4. Use proper personal protective equipment when handling hazardous materials.
- 5. Report damaged containers or spills to the appropriate Health and Safety Department immediately.
- 6. Request an MSDS from the manufacturer for any hazardous material that arrives in Findlay from a job. Also, a MSDS shall accompany any hazardous material that is sent to a job.

3.0 HAZARD DETERMINATION

OHM Corporation will rely on Material Safety Data Sheets from hazardous chemical supplies to meet hazard determination requirements. Other relevant data from laboratory analyses, chemical reference materials, and chemical manufacturers', written evaluation procedures will be utilized when warranted. No other method shall be used to determine chemical hazard unless approved by the Health and Safety.

4.0 LABELING

The shipping and receiving supervisors will be responsible for seeing that all containers arriving at OHM Corporation are properly and clearly labeled. Shipping and receiving supervisors shall also check all labels for chemical identity and appropriate hazard warnings. If the hazardous chemical is regulated by OSHA in a substance specific health standard, the supervisor or department manager shall ensure that the labels or other forms of warning used are in accordance with the requirements of that standard. Any container that is not labeled shall be immediately labeled correctly after initial discovery.

Each supervisor or department manager shall be responsible for seeing that all portable containers used in their work area are properly labeled with chemical identity and hazard warning.

Supervisors or department managers shall also ensure that labels on hazardous chemical containers are not removed or defaced unless the container is immediately marked with the required information and that all labels are legible in English and prominently displayed on the container or readily available in the work area throughout each shift.

If any container is found and the contents cannot be identified, the supervisor or manager shall be contacted immediately. When proper identification is made, a label shall be affixed to the container immediately. If it is discovered that no MSDS is available, the manufacturer and the Health and Safety Department shall be contacted to assist in locating the proper MSDS. If there is no way to identify the material in the container, the container should be set aside, away from all personnel until it can be tested by the Health and Safety Department or laboratory personnel. Supervisors and managers shall communicate their findings or awareness of such containers to all personnel in the area and to those who enter later.

5.0 MATERIAL SAFETY DATA SHEETS (MSDS)

Each supervisor or department manager at OHM Corporation will be responsible for maintaining a current MSDS relevant to the hazardous chemicals used in their area. The Health and Safety Department will be responsible for compiling the master MSDS file for the facility and aiding all shops/job sites with the completion and maintenance of their respective MSDS files.

All MSDS will be readily available for review by all employees during each work shift. Each shop/job site will designate a clearly marked "Employee Right-to-know" station where employees can immediately obtain a MSDS and the required information in an emergency.

Although manufacturers are required to provide employers with MSDSs on an initial chemical shipment, OHM Corporation purchasing agents (and supervisors purchasing their own material) shall request MSDSs and updates to MSDS on all purchase orders. Supervisors and department managers that are without proper MSDSs shall be responsible for requesting this information from manufacturers for chemicals. A file of followup letters shall be maintained for all hazardous chemical shipments received without MSDSs.

6.0 EMPLOYEE INFORMATION AND TRAINING

It is the responsibility of the supervisor in charge of each employee to ensure that the employee is properly trained. Training employees on chemical hazards and chemical handling is accomplished at the time of initial employment at OHM Corporation, whenever a new chemical (or physical) hazard is introduced into the work area, and through ongoing formal and informal training programs. Additionally, chemical hazards are communicated to employees through daily, morning, shop specific safety meetings, which shall be documented according to topic, major points discussed, and names of those attending (attendance is mandatory). Also, biweekly hazardous chemical safety meetings will be prepared by the Health and Safety Department using similar documentation for shop areas. Attendance is mandatory for these meetings also. Documentation for shop safety meetings will be available in the respective Employee Right-to-know stations and biweekly safety meeting documentation will be available in the Health and Safety Department to all employees for these meetings also. Documentation for shop safety meetings will be available in the respective Employee Right-to know stations and biweekly safety meeting documentation will be available in the Health and Safety Department to all employees for further referencing and questioning. Records of all formal training conducted at OHM Corporation is coordinated and maintained by the Training Department secretary.

At a minimum, OHM Corporation will inform employees on the following:

- The requirements of 29 CFR 1910.1200--Hazard Communication--Evaluating the potential hazards of chemicals and communication information concerning hazards and appropriate protective measures to employees. This is accomplished in several different ways including, but no limited to 40-hour OSHA Hazardous Waste Worker Training (29 CFR 1910.120), Shop safety meetings, job site safety meetings, Health and Safety Department safety meetings, and formal and informal training about specific chemical hazards.
- The location and availability of the written hazard communication program, list of hazardous chemicals, and MSDS sheets--Notices will be periodically posted on the employee bulletin boards providing the location of the above material.
- Any operations in their work area where hazardous chemicals are present.
- What the company has done to lessen or prevent workers' exposure to these chemicals.

Employee training shall include at least:

- Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area, (monitoring instruments, visual appearance or odor), and acute and chronic health effects.
- The physical and health hazards of the chemicals in the work area (accomplished through periodic physical and chemical hazard awareness sessions developed by the Health and Safety Department). These sessions shall serve as chemical hazards refreshers.
- The methods of preventing exposure to hazardous chemicals including the measures OHM Corporation has taken to protect the employees.

- Procedures to follow if OHM Corporation employees are exposed to hazardous chemicals (location of nearest phone, emergency eyewash, and shower will be included). These discussions shall include proper operating procedures for all emergency equipment.
- The details of the hazard communication program developed by OHM Corporation, including an explanation of the labeling system and the Material Safety Data Sheets, and how employees can obtain and use the appropriate hazard information.
- Standard operating procedures within each respective shop. OHM Corporation company policy determines what is considered standard operating procedures.
- Procedures for workers involved in non-routine tasks.

Each supervisor or department manager shall ensure that the above training is emphasized to OHM Corporation employees. The Health and Safety Department will ensure that each shop, department, and job site is properly informing and training all employees through daily group meeting and individual discussions. Whenever a new hazardous chemical is placed into use, the supervisor or department manager shall inform the employees of the hazards said chemical may pose. The supervisor or manager shall also be responsible for obtaining and making available a MSDS for the new chemical.

7.0 HAZARDOUS NON-ROUTINE TASKS

Occasionally, employees at OHM Corporation are required to perform tasks which are considered to be non-routine. All tasks considered to be non-routine shall be carefully discussed among the supervisor and those performing the task. This safety briefing shall include all possible hazards that may be encountered while completing the task, including:

- Hazard recognition
- Chemicals involved and their hazardous properties
- Physical hazards
- Methods of avoiding all hazards (technical instruments, proper personal protective equipment, etc.)

The following is list of some of the non-routine tasks which may occur at OHM Corporation together with some information needed to complete the tasks safely.

- Confined Space Entry
 - Obtain confined space entry procedure/permit from Health and Safety Department and follow all protocol before beginning task. compete and have supervisor sign permit before any work begins.
 - Monitor atmosphere with explosimeter, oxygen meter, and any toxic gas meter as may be appropriate.
 - Discuss specific chemical hazards.

- Discuss protective/safety measures the employee can take (e.g., Personal protective equipment and engineering controls) use of life lines, lock-out/tagout procedures, etc.
- Measures the company has taken to lessen the hazards including ventilation, respirator, presence of another employee, and emergency procedures.
- Excavation, Trenching, and Shoring
 - Obtain guidelines from Health and Safety Department before beginning task.
 - Comply with all requirements set forth for this activity in 29 CFR Subpart P (excavating, trenching, shoring).
 - Discuss specific chemical hazards.
 - Follow confined space entry procedure above if trench is above shoulder height.
 - Discuss protective/safety measures the employee can take.
 - Review appropriate accident prevention steps.
- Decontamination of Equipment
 - Determine possible contaminants and the hazards associated with them.
 - Determine personal protection needed by contacting the Health and Safety Department.
 - Alert all personnel in areas of contamination and decontamination
 - Contain and secure all contaminated materials and decontamination materials.
 - Contact the Health and Safety Department for proper disposal.

It is company policy that no OHM Corporation employee will begin work on any non-routine task without first receiving a safety briefing from their supervisor or a Health and Safety Department representative.

8.0 INFORMING CONTRACTORS

- Hazardous chemicals to which they may be exposed while performing a task including the following:
 - Chemical properties
 - Physical properties
 - Acute/Chronic health effects

- Location of "Employee Right-to Know" station which includes the following:
 - MSDS for work area
 - Hazard Communication Program
 - Other relevant safety material
- Precautionary measures to be taken to protect employees from chemical and physical hazards.
- Location of nearest emergency equipment (fire extinguisher, eyewash, shower, phone, first-aid kit, etc.)
- Procedures to follow in the event of employee exposure.
- Steps OHM Corporation has taken to reduce the risk of exposure to physical and chemical hazards including the following:
 - Safety meetings
 - Hazard Communication Program
 - Proper storage and labeling of hazardous chemicals
 - Health and Safety Department shop audits
- The methods used to label all hazardous chemicals.

The Health and Safety Department shall offer assistance in providing the above information to contractors working at OHM Corporation. On initial visit by a contractor to OHM Corporation, a "Contractor Right-to-Know" release form shall be completed. This form will state that the above information has been communicated to the perspective contractor.

APPENDIX C

Material Safety Data Sheet

from Genium's Reference Collection
Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8855



GENIUM PUBLISHING CORP.

No. 300

ACETONE

(Revision E)

Issued: September 1985

Revised: November 1988

SECTION 1. MATERIAL IDENTIFICATION

27

Material Name: ACETONE

Description (Origin/Uses): Used as a solvent for fats, oils, waxes, resins, rubber, plastics, varnishes, and rubber cements; also used in the manufacture of methyl isobutyl ketone, mesityl oxide, acetic acid, diacetone alcohol, chloroform, iodoform, bromoform, explosives, rayon, photographic films, and isoprene. Used to store acetylene gas. Widely used in the chemical process industry (CPI).



NFPA

Other Designations: Dimethylformaldehyde; Dimethylketal; Dimethyl Ketone; Ketone Propane; Pyroacetic Acid; Pyroacetic Ether; C_3H_6O ; CAS No. 0067-64-1

HMIS

H 1 R 1

F 3 I 1

R 0 S 2

PPG* K 4

Manufacturer: Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.

*See sect. 8

SECTION 2. INGREDIENTS AND HAZARDS

%

EXPOSURE LIMITS

Acetone, CAS No. 0067-64-1

Ca 100

OSHA PELs

8-Hr TWA: 750 ppm, 1800 mg/m³

STEL: 1000 ppm, 2400 mg/m³

ACGIH TLVs, 1988-89

TLV-TWA: 750 ppm, 1780 mg/m³

TVL-STEL: 1000 ppm, 2375 mg/m³

Toxicity Data*

Man, Inhalation, TD₀₁: 440 µg/m³ (6 Mins)

Man, Inhalation, TD₀₁: 10 mg/m³ (6 Hrs)

*See NIOSH, RTECS (AL3150000), for additional data with references to reproductive, mutagenic, and irritative effects.

SECTION 3. PHYSICAL DATA

Boiling Point: 134°F (56°C)

Melting Point: -137°F (-94°C)

Vapor Density (Air = 1): 2

Vapor Pressure: 180 Torr at 68°F (20°C)

Evaporation Rate: Faster than That of *n*-Butyl Acetate

Molecular Weight: 58 Grams/Mole

Solubility in Water (%): Complete

Specific Gravity ($H_2O = 1$): 0.778 at 77°F (25°C)

% Volatile by Volume: 100

Appearance and Odor: A clear, colorless, highly flammable, volatile liquid with a characteristic, pleasant, sweetish odor.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point: 1.4°F (-17°C) CC

Autoignition Temperature: 869°F (465°C)

LEL: 2.9% v/v

UEL: 12.8% v/v

Extinguishing Media: Use "alcohol" foam, dry chemical, or carbon dioxide. Use a blanketing effect to smother flames. Use water spray to reduce the rate of burning and to cool containers. Water will probably not be effective in directly extinguishing an acetone fire.

Unusual Fire or Explosion Hazards: Acetone vapor is heavier than air and may travel a considerable distance to a low-lying source of ignition and flash back.

Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

SECTION 5. REACTIVITY DATA

Stability/Polymerization: Acetone is stable in closed containers during routine operations. Hazardous polymerization cannot occur.

Chemical Incompatibilities: Acetone can react dangerously with strong oxidizing agents such as nitrates, perchlorates, permanganates, and concentrated sulfuric acid; chromic anhydride; chromyl chloride; hydrogen peroxide; hexachloromelamine; nitrosyl chloride; permonosulfuric acid; mixtures of sulfuric acid and nitric acid; mixtures of nitric acid and acetic acid; and potassium *tert*-butoxide.

Conditions to Avoid: Do not expose acetone to sources of ignition and incompatible chemicals.

Hazardous Products of Decomposition: Carbon monoxide and carbon dioxide can be produced during acetone fires.

SECTION 6. HEALTH HAZARD INFORMATION

Carcinogenicity: Acetone is not listed as a carcinogen by the NTP, IARC, or OSHA.

Summary of Risks: Inhalation of high concentrations of acetone vapor can cause dryness of the mouth and throat; dizziness, nausea, incoordination, slurred speech, drowsiness, and, in severe exposures, coma. Inhalation of small quantities of acetone vapor for an extended period causes irritation of the respiratory tract, coughing, and headache. Prolonged or repeated skin contact with acetone has a defatting effect causing dryness, irritation, and mild dermatitis. Under routine operating conditions the amount of acetone absorbed through the skin is small. Ingestion of acetone may cause irritation of the gastrointestinal tract and narcosis. Acetone acts primarily as a depressant to the central nervous system (CNS) when exposures are severe or prolonged. **Medical Conditions Aggravated by Long-Term Exposure:** None reported. **Target Organs:** Skin, eyes, respiratory system, and CNS. **Primary Entry:** Inhalation, skin contact. **Acute Effects:** See **Summary of Risks**, above. **Chronic Effects:** None reported. **FIRST AID:** **Eyes.** Immediately flush eyes, including under the eyelids, gently but thoroughly with flooding amounts of running water for at least 15 minutes. **Skin.** Rinse the affected area with flooding amounts of water, then wash it with soap and water. **Inhalation.** Remove the exposed person to fresh air; restore and/or support his or her breathing as needed. Have qualified medical personnel administer oxygen as required. Monitor the exposed person for symptoms of depression of the CNS such as incoordination and drowsiness. **Ingestion.** Unlikely.* If a small amount is ingested, dilute it slowly with 1 to 2 glasses of water or milk. **Get medical help (in plant, paramedic, community) for all exposures.** Seek prompt medical assistance for further treatment, observation, and support after first aid. ***Note to Physician:** Treatment for accidental ingestion of a small amount of acetone is unnecessary. If a large amount has been ingested, administer a charcoal slurry, either aqueous or mixed with a saline cathartic or sorbital.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: Notify safety personnel, evacuate unnecessary personnel, eliminate all sources of ignition immediately, and provide adequate ventilation. Cleanup personnel need protection against this liquid's contact with skin or eyes as well as inhalation of its vapor (see sect. 8). Contain large spills and collect waste or absorb it with an inert material such as sand, earth, or vermiculite. Use nonsparking tools to place waste liquid or absorbent into closable containers for disposal. Keep waste out of sewers, watersheds, and waterways. **Waste Disposal:** Contact your supplier or a licensed contractor for detailed recommendations. Follow Federal, state, and local regulations. Consider saving the waste hydrochloric acid for use as a neutralizing agent during cleanup operations of basic materials.

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000 Subpart Z).

EPA Designations (40 CFR 302.4)

RCRA Hazardous Waste, No. U002

CERCLA Hazardous Substance, Reportable Quantity: 5000 lbs (2270 kg), per the Resource Conservation and Recovery Act, § 3001.

SECTION 8. SPECIAL PROTECTION INFORMATION

Goggles: Always wear protective eyeglasses or chemical safety goggles. Where splashing is possible, wear a full face shield. Follow OSHA eye- and face-protection regulations (29 CFR 1910.133). **Respirator:** Use a NIOSH-approved respirator per Genium reference 88 for the maximum-use concentrations and/or the exposure limits cited in section 2. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (spills or cleaning reactor vessels and storage tanks), wear an SCBA. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious butyl or natural rubber gloves, boots, aprons, and gauntlets, etc., to prevent prolonged or repeated contact with this material. **Ventilation:** Install and operate general and local maximum, explosion-proof ventilation systems powerful enough to maintain airborne levels of acetone below the OSHA PEL standard cited in section 2. Local exhaust ventilation is preferred because it prevents dispersion of the contaminant into the general work area by eliminating it at its source. Consult the latest edition of Genium reference 103 for detailed recommendations. **Safety Stations:** Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work areas. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them. Do *not* wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean this material from your shoes and equipment. **Other:** Automatic sprinkler systems for fire protection are desirable in work areas. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material. Keep it off your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in any work area. Do not inhale acetone vapor.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage/Segregation: Store acetone in closed containers (carbon steel is recommended) in a cool, dry, well-ventilated area away from sources of ignition and strong oxidizers. Protect containers from physical damage. **Engineering Controls:** Make sure all engineering systems (production, transportation) are of maximum explosion-proof design. Electrically ground and bond all containers and pipelines, etc., used in shipping, transferring, reacting, production, and sampling operations to prevent generating static sparks. **Other Precautions:** Use labeled safety cans when handling small amounts of acetone. Acetone presents a dangerous fire hazard; perform all work operations involving it carefully and in a way that will prevent exposing the liquid or its vapor to sources of ignition.

Transportation Data (49 CFR 172.101-2)

DOT Shipping Name: Acetone

DOT Hazard Class: Flammable Liquid

ID No. UN1090

DOT Label: Flammable Liquid

IMO Hazard Class: 3.1

IMO Label: Flammable Liquid

IMDG Packaging Group: II

References: 1, 26, 38, 84-94, 100, 116, 117, 120, 122.

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Prepared by PJ Igoe, BS

Industrial Hygiene Review: DJ Wilson, CIH

Medical Review: MJ Hardies, MD

**Genium Publishing Corporation**

1145 Catalyn Street
Schenectady, NY 12303-1836 USA
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Material Safety Data Sheets Collection:

Sheet No. 316
Benzene

Issued: 11/78

Revision: E, 8/90

32

Section 1. Material Identification

Benzene (C₆H₆) Description: Derived by fractional distillation of coal tar, hydrodealkylation of toluene or pyrolysis of gasoline, catalytic reforming of petroleum, and transalkylation of toluene by disproportionation reaction. Used as a fuel; a chemical reagent; a solvent for a large number of materials such as paints, plastics, rubber, inks, oils, and fats; in manufacturing phenol, ethylbenzene (for styrene monomer), nitrobenzene (for aniline), dodecylbenzene (for detergents), cyclohexane (for nylon), chlorobenzene, diphenyl, benzene hexachloride, maleic anhydride, benzene-sulfonic acid, artificial leather, linoleum, oil cloth, varnishes, and lacquers; for printing and lithography; in dry cleaning; in adhesives and coatings; for extraction and rectification; as a degreasing agent; in the tire industry; and in shoe factories. Benzene has been banned as an ingredient in products intended for household use and is no longer used in pesticides.

Other Designations: CAS No. 0071-43-2, benzol, carbon oil, coal naphtha, cyclohexatriene, mineral naphtha, nitration benzene, phen, phenyl hydride, pyrobenzol.

Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*TM for a suppliers list.

R 1
I 4
S 2*
K 4
*Skin absorption



HMIS
H 3
F 3
R 0
PPG†
† Sec. 8

Cautions: Benzene is a confirmed human carcinogen by the IARC. Chronic low-level exposure may cause cancer (leukemia) and bone marrow damage, with injury to blood-forming tissue. It is also a dangerous fire hazard when exposed to heat or flame.

Section 2. Ingredients and Occupational Exposure Limits

Benzene, ca 100%*

1989 OSHA PELs
(29 CFR 1910.1000, Table Z-1-A)

8-hr TWA: 1 ppm, 3 mg/m³

15-min STEL: 5 ppm, 15 mg/m³

(29 CFR 1910.1000, Table Z-2)

8-hr TWA: 10 ppm

Acceptable Ceiling Concentration: 25 ppm

Acceptable Maximum Peak: 50 ppm (10 min)†

1989-90 ACGIH

TLV-TWA: 10 ppm, 32 mg/m³

1988 NIOSH RELs

TWA: 0.1 ppm, 0.3 mg/m³

Ceiling: 1 ppm, 3 mg/m³

1985-86 Toxicity Data†

Man, oral, LD₅₀: 50 mg/kg; no toxic effect noted

Man, inhalation, TC₅₀: 150 ppm inhaled intermittently over 1 yr in a number of discrete, separate doses affects the blood (other changes) and nutritional and gross metabolism (body temperature increase)

Rabbit, eye: 2 mg administered over 24 hr produces severe irritation

* OSHA 29 CFR 1910.1000, Subpart Z, states that the final benzene standard in 29 CFR 1910.1028 applies to all occupational exposures to benzene except in some subsegments of industry where exposures are consistently under the action level (i.e., distribution and sale of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures); for the excepted subsegments, the benzene limits in Table Z-2 apply.

† Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift.

‡ See NIOSH, *RTECS* (CY1400000), for additional irritative, mutative, reproductive, tumorigenic, and toxicity data.

Section 3. Physical Data

Boiling Point: 176 °F (80 °C)

Melting Point: 42 °F (5.5 °C)

Vapor Pressure: 100 mm Hg at 79 °F (26.1 °C)

Vapor Density (Air = 1): 2.7

Evaporation Rate (Ether = 1): 2.8

Molecular Weight: 78.11

Specific Gravity (15 °C/4 °C): 0.8787

Water Solubility: Slightly (0.180 g/100 g of H₂O at 25 °C)

% Volatile by Volume: 100

Viscosity: 0.6468 mPa at 20 °C

Appearance and Odor: A colorless liquid with a characteristic sweet, aromatic odor. The odor recognition threshold (100% of panel) is approximately 5 ppm (unfatigued) in air. Odor is not an adequate warning of hazard.

Section 4. Fire and Explosion Data

Flash Point: 12 °F (-11.1 °C), CC

Autoignition Temperature: 928 °F (498 °C)

LEL: 1.3% v/v

UEL: 7.1% v/v

Extinguishing Media: Use dry chemical, foam, or carbon dioxide to extinguish benzene fires. Water may be ineffective as an extinguishing agent; since it can scatter and spread the fire. Use water spray to cool fire-exposed containers, flush spills away from exposures, disperse benzene vapor, and protect personnel attempting to stop an unignited benzene leak.

Unusual Fire or Explosion Hazards: Benzene is a Class 1B flammable liquid. A concentration exceeding 3250 ppm is considered a potential fire explosion hazard. Benzene vapor is heavier than air and can collect in low lying areas or travel to an ignition source and flash back. Explosive and flammable benzene vapor-air mixtures can easily form at room temperature. Eliminate all ignition sources where benzene is used, handled, or stored.

Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective equipment. Structural firefighter's protective clothing provides limited protection. Stay out of low areas. Be aware of runoff from fire control methods. Do not release to sewers or waterways. Runoff to sewer can create pollution, fire, and explosion hazard.

Section 5. Reactivity Data

Stability/Polymerization: Benzene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.

Chemical Incompatibilities: Benzene explodes on contact with diborane, permanganic acid, bromine pentafluoride, peroxodisulfuric acid, and peroxomonosulfuric acid. It ignites on contact with dioxygen difluoride, dioxygenyl tetrafluoroborate, iodine heptafluoride, and sodium peroxide + water. Benzene forms sensitive, explosive mixture with iodine pentafluoride, ozone, liquid oxygen, silver perchlorate, nitryl perchlorate, nitric acid, and arsenic pentafluoride + potassium methoxide (explodes above 30 °C). A vigorous or incandescent reaction occurs with bromine trifluoride, uranium hexafluoride, and hydrogen + Raney nickel (above 410 °F (210 °C)). Benzene is incompatible with oxidizing materials.

Conditions to Avoid: Avoid heat and ignition sources.

Hazardous Products of Decomposition: Thermal oxidative decomposition of benzene can produce toxic gases and vapors such as carbon monoxide.

Section 6. Health Hazard Data

Carcinogenicity: The ACGIH, OSHA, and IARC list benzene as, respectively, a suspected human carcinogen, a cancer hazard, and, based on sufficient human and animal evidence, a human carcinogen (Group 1).

Summary of Risks: Prolonged skin contact or excessive inhalation of benzene vapor may cause headache, weakness, appetite loss, and fatigue. The most important health hazards are cancer (leukemia) and bone marrow damage with injury to blood-forming tissue from chronic low-level exposure. Higher level exposures may irritate the respiratory tract and cause central nervous system (CNS) depression.

Medical Conditions Aggravated by Long-Term Exposure: Exposure may worsen ailments of the heart, lungs, liver, kidneys, blood, and CNS.

Target Organs: Blood, central nervous system, bone marrow, eyes, upper respiratory tract, and skin.

Primary Entry Routes: Inhalation, skin contact.

Acute Effects: Symptoms of acute overexposure include irritation of the eyes, nose, and respiratory tract, breathlessness, euphoria, nausea, drowsiness, headache, dizziness, and intoxication. Severe exposure may lead to convulsions and unconsciousness. Skin contact may cause a drying rash (dermatitis).

Chronic Effects: Long-term chronic exposure may result in many blood disorders ranging from aplastic anemia (an inability to form blood cells) to leukemia.

FIRST AID

Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.

Skin: Quickly remove contaminated clothing. Immediately rinse with flooding amounts of water for at least 15 min. For reddened or blistered skin, consult a physician. Wash affected area with soap and water.

Inhalation: Remove exposed person to fresh air. Emergency personnel should protect against inhalation exposure. Provide CPR to support breathing or circulation as necessary. Keep awake and transport to a medical facility.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, *do not induce vomiting* since aspiration may be fatal. Call a physician immediately.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Physician's Note: Evaluate chronic exposure with a CBC, peripheral smear, and reticulocyte count for signs of myelotoxicity. Follow up any early indicators of leukemia with a bone marrow biopsy. Urinary phenol conjugates may be used for biological monitoring of recent exposure.

Acute management is primarily supportive for CNS depression.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Design and practice a benzene spill control and countermeasure plan (SCCP). Notify safety personnel, evacuate all unnecessary personnel, eliminate all heat and ignition sources, and provide adequate ventilation. Cleanup personnel should protect against vapor inhalation, eye contact, and skin absorption. Absorb as much benzene as possible with an inert, noncombustible material. For large spills, dike far ahead of spill and contain liquid. Use nonsparking tools to place waste liquid or absorbent into closable containers for disposal. Keep waste out of confined spaces such as sewers, watersheds, and waterways because of explosion danger. Follow applicable OSHA regulations (29 CFR 1910.120).

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations

Listed as a RCRA Hazardous Waste (40 CFR 261.33), Hazardous Waste No. U019

Listed as a CERCLA Hazardous Substance* (40 CFR 302.4), Reportable Quantity (RQ): 1000 lb (454 kg) [* per Clean Water Act, Sec. 307 (a), 311 (b)(4), 112; and per RCRA, Sec. 3001]

SARA Extremely Hazardous Substance (40 CFR 355): Not listed

Listed as SARA Toxic Chemical (40 CFR 372.65)

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000, Tables Z-1-A and Z-2)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).

Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. **Warning!** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Other: Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact.

Ventilation: Provide general and local explosion-proof ventilation systems to maintain airborne concentrations at least below the OSHA PELs (Sec. 2). Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.⁽¹⁶⁹⁾

Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in tightly closed containers in a cool, dry, well-ventilated area away from all heat and ignition sources and incompatible materials. **Caution!** Benzene vapor may form explosive mixtures in air. To prevent static sparks, electrically ground and bond all containers and equipment used in shipping, receiving, or transferring operations in production and storage areas. When opening or closing benzene containers, use nonsparking tools. Keep fire extinguishers readily available.

Engineering Controls: Because OSHA specifically regulates benzene (29 CFR 1910.1028), educate workers about its potential hazards and dangers. Minimize all possible exposures to carcinogens. If possible, substitute less toxic solvents for benzene; use this material with extreme caution and only if absolutely essential. Avoid vapor inhalation and skin and eye contact. Use only with adequate ventilation and appropriate personal protective gear. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation.

Designate regulated areas of benzene use (see legend in the box below) and label benzene containers with "DANGER, CONTAINS BENZENE, CANCER HAZARD."

Other Precautions: Provide preplacement and periodic medical examinations with emphasis on a history of blood disease or previous exposure.

Transportation Data (49 CFR 172.101, .102)

DOT Shipping Name: Benzene (benzol)

DOT Hazard Class: Flammable liquid

ID No.: UN1114

DOT Label: Flammable liquid

DOT Packaging Exceptions: 173.118

DOT Packaging Requirements: 173.119

IMO Shipping Name: Benzene

IMO Hazard Class: 3.2

ID No.: UN1114

IMO Label: Flammable liquid

IMDG Packaging Group: II

**DANGER
BENZENE
CANCER HAZARD
FLAMMABLE-NO SMOKING
AUTHORIZED PERSONNEL ONLY
RESPIRATOR REQUIRED**

Material Safety Data Sheet

from Genium's Reference Collection
Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8855



GENIUM PUBLISHING CORP.

No. 385

ETHYL BENZENE

(Revision A)

Issued: August 1978

Revised: November 1988

SECTION 1. MATERIAL IDENTIFICATION

27

Material Name: ETHYL BENZENE

Description (Origin/Uses): Used as a solvent and as an intermediate in the production of styrene monomer.

Other Designations: Phenylethane; Ethylbenzol; C_8H_{10} ; CAS No. 0100-41-4

Manufacturer: Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.



NFPA

HMIS		
H	2	R 1
F	3	I 3
R	0	S 2
PPG*		K 4

*See sect. 8

SECTION 2. INGREDIENTS AND HAZARDS

%

EXPOSURE LIMITS

Ethyl Benzene, CAS No. 0100-41-4

Ca 100

OSHA PELs

8-Hr TWA: 100 ppm, 435 mg/m³

15- Min STEL: 125 ppm, 545 mg/m³

ACGIH TLVs, 1988-89

TLV-TWA: 100 ppm, 435 mg/m³

TLV-STEL: 125 ppm, 545 mg/m³

Toxicity Data*

Human, Inhalation, TC_L: 100 ppm (8 Hrs)

Rat, Oral, LD₅₀: 3500 mg/kg

*See NIOSH, RTECS (DA0700000), for additional data with references to reproductive, irritative, and mutagenic effects.

SECTION 3. PHYSICAL DATA

Boiling Point: 277°F (136°C)

Melting Point: -139°F (-95°C)

Vapor Pressure: 7.1 Torrs at 68°F (20°C)

Vapor Density (Air = 1): 3.7

% Volatile by Volume: Ca 100

Molecular Weight: 106 Grams/Mole

Solubility in Water (%): Slight

Specific Gravity (H₂O = 1): 0.86258 at 77°F (25°C)

Appearance and Odor: A clear, colorless, flammable liquid; characteristic aromatic hydrocarbon odor.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point and Method: 64°F (18°C) CC

Autoignition Temperature: 810°F (432.22°C)

LEL: 1% v/v

UEL: 6.7% v/v

Extinguishing Media: Use foam, dry chemical, or carbon dioxide to put out ethyl benzene fires. A water spray may be ineffective in extinguishing the fire, because it can scatter and spread the burning liquid. Use water spray to cool fire-exposed containers of ethyl benzene, to disperse ethyl benzene vapor, and to protect personnel attempting to stop an ethyl benzene leak. Unusual Fire or Explosion Hazards: This liquid can readily form explosive vapor-air mixtures, especially when heated. Ethyl benzene vapor is heavier than air and may travel a considerable distance to a low-lying source of ignition and flash back to its origin. Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

SECTION 5. REACTIVITY DATA

Stability/Polymerization: Ethyl benzene is stable in closed containers during routine operations. Hazardous polymerization cannot occur.

Chemical Incompatibilities: Hazardous chemical reactions can occur between ethyl benzene and strong oxidizing agents, acids, ammonia, and bases. Conditions to Avoid: Avoid any exposure to sources of ignition such as heat, sparks, open flame, and lighted tobacco products, etc., and to incompatible chemicals. Use caution when entering confined spaces, particularly low-lying areas where explosive concentrations of ethyl benzene vapor may be present. Provide good ventilation to such areas to prevent the concentration of this vapor. Hazardous Products of Decomposition: Thermal-oxidative degradation can include toxic gases such as carbon monoxide and/or aromatic hydrocarbon gases.

SECTION 6. HEALTH HAZARD INFORMATION

Carcinogenicity: Ethyl benzene is not listed as a carcinogen by the NTP, IARC, or OSHA.

Summary of Risks: Ethyl benzene vapor is severely irritating to the eyes and to the mucous membranes of the respiratory system. Sustained inhalation of excessive levels can cause depression of the central nervous system (CNS) characterized by dizziness, headache, narcosis, and coma. Skin contact with liquid ethyl benzene causes irritation; dermatitis and defatting can also develop. The acute oral toxicity of ethyl benzene is low; however, ingestion of it presents a serious aspiration hazard. Aspirating even a small amount into the lungs can result in extensive edema (lungs filled with fluid) and hemorrhaging of the lung tissue. No systemic effects are expected at the levels that produce pronounced, unignorable, disagreeable skin and eye irritation. The TLVs cited in section 2 are set to prevent this intolerable irritation. Medical Conditions Aggravated by Long-Term Exposure: None reported. Target Organs: Skin, eyes, respiratory system, and CNS. Primary Entry: Inhalation, skin contact Acute Effects: Irritation of the skin, eyes, and respiratory system. Also, cardiac-rhythm disturbance due to sensitization; acute bronchitis, bronchospasm, pulmonary and laryngeal edema; euphoria; headache; giddiness; dizziness; and irritation, as well as possible depression, confusion, and coma Chronic Effects: None reported. First Aid: Eyes. Immediately

SECTION 6. HEALTH HAZARD INFORMATION, cont.

Flush eyes, including under the eyelids, gently but thoroughly with flooding amounts of running water for at least 15 minutes. Skin. Rinse the affected area with plenty of water, then wash it with soap and water. Inhalation. Remove the exposed person to fresh air; restore and/or support his or her breathing as needed. Have qualified medical personnel administer oxygen as required. Ingestion. Unlikely. Should this type of exposure occur, the aspiration hazard must be considered. Do not induce vomiting unless directed to do so by a physician. To prevent aspiration by spontaneous vomiting, keep the victim's head low (between his or her knees). Get medical help (in plant, paramedic, community) for all exposures. Seek prompt medical assistance for further treatment, observation, and support after first aid. Note to Physician: Professional judgment is required as to whether or not to induce vomiting because of the possibility of aspiration. A gastric lavage may be administered, followed by saline catharsis, if this procedure is appropriate to the specific incident. Monitor cardiac and pulmonary functions.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: Notify safety personnel, evacuate unnecessary personnel, eliminate all sources of ignition immediately, and provide adequate explosion-proof ventilation. Cleanup personnel need protection against skin or eye contact with this liquid as well as inhalation of its vapor (see sect. 8). Contain large spills and collect waste or absorb it with an inert material such as sand, earth, or vermiculite. Use nonsparking tools to place waste liquid or absorbent into closable containers for disposal. Keep waste out of sewers, watersheds, and waterways. Waste Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow Federal, state, and local regulations.

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000 Subpart Z).

EPA Designations (40 CFR 302.4)

CERCLA Hazardous Substance, Reportable Quantity: 1000 lbs (454 kg), per the Clean Water Act (CWA), §§ 311 (b) (4) and 307 (a).

SECTION 8. SPECIAL PROTECTION INFORMATION

Goggles: Always wear protective eyeglasses or chemical safety goggles. Where splashing is possible, wear a full face shield. Follow OSHA eye- and face-protection regulations (29 CFR 1910.133). **Respirator:** Wear a NIOSH-approved respirator per Genium reference 88 for the maximum-use concentrations and/or the exposure limits cited in section 2. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (spills or cleaning reactor vessels and storage tanks), wear an SCBA. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves, boots, aprons, and gauntlets, etc., to prevent prolonged or repeated skin contact with this material. **Ventilation:** Install and operate general and local maximum, explosion-proof ventilation systems powerful enough to maintain airborne levels of this material below the OSHA PEL standard cited in section 2. Local exhaust ventilation is preferred because it prevents dispersion of the contaminant into the general work area by eliminating it at its source. Consult the latest edition of Genium reference 103 for detailed recommendations. **Safety Stations:** Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work areas. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them. Do *not* wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean this material from shoes and equipment. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material and before eating, drinking, smoking, using the toilet, or applying cosmetics. Keep it off your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in any work area. Do not inhale ethyl benzene vapor.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage/Segregation: Store ethyl benzene in closed containers in a cool, dry, well-ventilated area away from sources of ignition and strong oxidizers. Protect containers from physical damage. **Special Handling/Storage:** Outside, isolated, detached, or remote storage is recommended for large quantities of ethyl benzene. Isolate bulk storage areas from acute fire hazards. **Engineering Controls:** Make sure all engineering systems (production, transportation) are of maximum explosion-proof design. To prevent static sparks, electrically ground and bond all containers, pipelines, etc., used in shipping, transferring, reacting, production, and sampling operations. **Other:** Use safety cans for transferring small amounts of ethyl benzene.

Transportation Data (49 CFR 172.101-2)

DOT Shipping Name: Ethyl Benzene

DOT Hazard Class: Flammable Liquid

ID No. UN1175

DOT Label: Flammable Liquid

DOT Packaging Exceptions: 49 CFR 173.118

DOT Packaging Requirements: 49 CFR 173.119

IMO Shipping Name: Ethylbenzene

IMO Hazard Class: 3.2

IMO Label: Flammable Liquid

IMDG Packaging Group: II

References: 1, 26, 38, 84-94, 100, 116, 117, 120, 122.

Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, Genium Publishing Corp. extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.

Prepared by PJ Igoe, BS

Industrial Hygiene Review: DJ Wilson, CIH

Medical Review: W Silverman, MD

MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION

1145 CATALYN ST., SCHENECTADY, NY 12303 USA (518) 377-8854



MSDS # 320

2-BUTOXYETHANOL
REVISION C

Issued: October 1979

Revised: September 1985

From Genium's MSDS Collection, to be used as a reference.

SECTION 1. MATERIAL IDENTIFICATION

17

MATERIAL NAME: 2-BUTOXYETHANOL, Revision C

OTHER DESIGNATIONS: Butyl Cellosolve, o-Butyl ethylene glycol, Butyl glycol, Butyl Oxitol, DOWANOL EB, Ethylene Glycol n-Butyl ether, Ethylene glycol monobutyl ether, Glycol butyl ether, 3-Oxo-1-heptanol, $\text{CH}_3(\text{CH}_2)_3\text{OCH}_2\text{CH}_2\text{OH}$, CAS #0111 76 2

MANUFACTURER/SUPPLIER: Dow Chemical USA
Available from many
suppliers, including: 2020 Dow Center
Midland, MI 48640

Telephone: (517) 636-1000

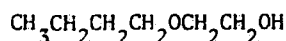


SECTION 2. INGREDIENTS AND HAZARDS

%

HAZARD DATA

2-Butoxyethanol



* Current (1985-86) ACGIH TLV/STEL.
OSHA PEL is 50 ppm, 240 mg/m³ (skin).
Skin notation indicates a significant contribution to overall exposure via skin absorption.

ca 100

8 hr TWA: 25 ppm,
120 mg/m³ (skin)
STEL: 75 ppm, 360 mg/m³*

Human, Inhalation TCLO:
195 ppm/8h: IRR

Rat, Oral LD50:
1480 mg/kg

Rabbit, skin LD50:
490 mg/kg

SECTION 3. PHYSICAL DATA

Boiling point, 1 atm 340°F (171°C)
Vapor pressure, 20°C, mmHg ... 0.6
Vapor density (Air=1) 4.07
Solubility in water complete

Specific gravity (H₂O=1) 0.90
Volatiles, % ca 100
Evaporation rate (BuAc=1) ... 0.07
Pour point -94°F (-70°C)
Molecular weight 118.20

APPEARANCE & ODOR: Clear liquid with a slight ethereal odor. Recognition threshold for the odor is 0.48 ppm in air (100% of test panel, unfatigued).

SECTION 4. FIRE AND EXPLOSION DATA

Lower

Upper

Flash Point and Method

Autoignition Temp.

Flammability Limits in Air

138°F (58.9°C) T.C.C.

472°F (244°C)

% by Volume

1.1

12.7

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical, alcohol type foam. Do not use a solid stream of water since the stream will scatter and spread the fire. Use water spray to cool fire-exposed tanks/containers. 2-Butoxyethanol is a moderate fire hazard when exposed to heat, flame or strong oxidizers. Vapors are heavier than air and may travel a considerable distance to an ignition source and flashback. Firefighters should wear self-contained breathing apparatus and full protective clothing when fighting fires involving 2-Butoxyethanol.

SECTION 5. REACTIVITY DATA

This combustible material is an OSHA Class IIIA liquid. It is stable in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization. 2-Butoxyethanol is incompatible with oxidizers, alkalis, heat or flame. It will attack some forms of plastics, rubber, and coatings. Auto-oxidation may produce peroxides. 2-Butoxyethanol may attack metallic aluminum at high temperatures.

Thermal decomposition or burning produces toxic vapors and gases including carbon monoxide.

SECTION 6. HEALTH HAZARD INFORMATION

TLV 25 ppm (skin) See Section 2

Vapors of 2-Butoxyethanol are irritating to the eyes, nose and throat at concentrations above 100 ppm. The low vapor pressure and slow evaporation of this material at room temperature minimize the inhalation hazard. If overexposure does occur, however, headache, nausea, vomiting, drowsiness, and unconsciousness may result. Prolonged exposure to vapors may cause damage to the liver, kidneys, lungs, and red blood cells, causing blood in the urine. Tears, temporary clouding of the cornea, drowsiness and shortness of breath may also be observed. 2-Butoxyethanol readily penetrates the skin, and toxic action from excessive skin exposure may be more likely than from vapor inhalation. Symptoms of toxic skin absorption are similar to those observed after inhalation exposure. The liquid is damaging to the eyes and causes pain, conjunctival irritation and transitory corneal injury. It is highly toxic by ingestion. The TLV is set to prevent irritation and systemic effects. **FIRST AID: SKIN CONTACT:** Remove contaminated clothing, and immediately flush exposed area with water. Wash skin with soap and water. Get medical help for persistent irritation or if large areas were exposed. **EYE CONTACT:** Immediately flush eyes with copious amounts of water for at least 15 minutes, making sure to flush under the eyelids. Get medical assistance (inplant, Paramedic, community). **INHALATION:** Remove person to fresh air. Restore and/or support breathing as required. Get medical assistance (inplant, Paramedic, community). **INGESTION:** Give victim one or two glasses of water. Induce vomiting by giving 30 cc (2 tablespoons) Syrup of Ipecac or by sticking finger to back of throat. Contact a physician or Poison Control Center. Never give anything by mouth to a person who is unconscious or is having convulsions. **NOTE:** Give children 1 glass of water and 15 cc (1 tablespoon) Syrup of Ipecac.

SECTION 7. SPILL, LEAK AND DISPOSAL PROCEDURES

Notify safety personnel of large spills or leaks. Provide maximum explosion-proof ventilation to disperse vapors. Remove all sources of heat and ignition. Evacuate all personnel from the area, except for those involved in clean-up. Remove leaking containers to safe place if feasible. Absorb small quantities on paper towel or vermiculite and place in closed container for disposal. Dike large spills and collect for reclamation or disposal. Liquid or residues may be flushed with water to an open area (not to sewer). Clean-up personnel should wear respiratory equipment and protective clothing to prevent personal exposure.

DISPOSAL: Place in closed container for disposal by licensed contractor or burn in an approved incinerator. Follow all Federal, State and Local regulations.

SECTION 8. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation (explosion-proof) to meet TLV requirements. For emergency or nonroutine exposures where the TLV may be exceeded, use an appropriate NIOSH-approved full face respirator. All electrical service in use or storage areas should have an explosion-proof design. Prevent skin contact by wearing impermeable gloves and protective clothing, apron, boots, etc. as required, depending upon the situation. Wear safety goggles and/or faceshield when splashing is possible. Remove contaminated clothing immediately and do not reuse until it has been properly laundered. Eyewash stations and safety showers should be readily accessible to use and handling areas.

Contact lenses pose a special hazard; soft lenses may absorb and all lenses concentrate irritants.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Store in closed containers in a cool, dry, well-ventilated area away from oxidizers, heat, sparks, or open flame. Protect containers from physical damage. Do not store 2-Butoxyethanol in aluminum containers. Use caution when handling this compound since it can be readily absorbed through the skin to produce toxic effects. Use only with adequate ventilation and avoid breathing vapors. Employees working with 2-Butoxyethanol should be given preplacement and periodic medical exams which include evaluation of the CNS, kidneys, liver, lungs, skin and blood. Do not smoke or eat in areas when this material is being used or handled. Ground and bond containers and equipment when transferring or pouring to prevent static sparks. Use non-sparking tools. **DOT CLASSIFICATION:** Not regulated.

DATA SOURCE(S) CODE (See Glossary) 1-4, 6-9, 12, 21, 23, 26, 47, 59, 79.R.

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APPROVALS

J. R. R. R. R. 11/85

INDUST. HYGIENE/SAFETY

J. W. 11.85

MEDICAL REVIEW:

J. R. R. R. R. Dec 85

MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION
1145 CATALYN STREET
SCHENECTADY, NY 12303-1836 USA
(518) 377-8855



NO. 338

n-BUTYL ACETATE
Revision B

DATE May 1984

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: n-BUTYL ACETATE

OTHER DESIGNATIONS: Butyl Acetate, Normal Butyl Acetate, Butyl Ethanoate, Acetic Acid Butyl Ester, $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{O}-\text{CCH}_3$, ASTM D303 (90-92%), ASTM D3126 (98%), GE Material D5E11, CAS #000-123 864.

MANUFACTURER: Available from several suppliers, including:

Allied Chemical P.O. Box 1087K Morristown, NJ 07960 Tel: (201) 455-4400	Union Carbide Old Ridgebury Road Danbury, CT 06817 Tel: (304) 744-3487	Celanese Chemical Co. 1250 West Mockingbird Lane Dallas, TX 75257 Tel: (214) 689-4000
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SECTION II. INGREDIENTS AND HAZARDS

n-Butyl Acetate

Impurities:

n-Butyl Alcohol (MSDS #337) }
n-Butyl Ether }

*Current OSHA PEL and ACGIH (1983) TLV. TLV set at a level to prevent irritation of eyes and respiratory tract.

**ACGIH(1983) TLV. Current OSHA PEL is 100 ppm.

%

HAZARD DATA

90-100	8-hr TWA 150 ppm or 710 mg/m ³ *
<10	8-hr TWA C50ppm(skin)** No TLV Established
	Rat, Oral LD ₅₀ 14 g/kg
	Human, Inhalation TLV 200 ppm
	Irritation Effects Human, Eye 300 ppm
	Irritation Effects

SECTION III. PHYSICAL DATA

Boiling range, 1 atm, deg C	90-92% 118-128	98+% 120-128	ca 100% 125-127	Vapor density (Air=1)	-- 4
Vapor pressure @ 25 C, mm Hg	15	8	15	Solubility in water at 20 C, %	ca 0.7
Specific gravity, 20/20 C	0.875	0.881	0.884	Volatiles, %	ca 100
Freezing point, deg C	-	-76.8	-77.9	Rate of evaporation (CCl ₄ =1)	5.8
Viscosity @ 20C, cp	0.73	0.74	-	Molecular weight	116

Appearance & Odor: A clear, nearly colorless mobile liquid with a characteristic fruity odor. Threshold odor concentration: 7 ppm

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits in Air	Lower	Upper
>72 F (22 C) TCC	790 F (421 C)	% by volume	1.7	7.6

Extinguishing media: CO₂, dry chemical, foam, and water fog or spray. Water may be ineffective in putting out fire but can be used to cool surroundings and containers and to disperse vapors.

This flammable liquid becomes a dangerous fire hazard when heated. It can also be a moderate explosion hazard when present in a fire situation. Vapors can flow along surfaces, reach distant ignition sources and flashback.

Firefighters should wear self-contained breathing apparatus with a full facepiece.

SECTION V. REACTIVITY DATA

This is a stable material in closed containers at room temperature. It does not polymerize. Incompatible with potassium-tert-butoxide, oxidizing agents, strong alkalies and acids. Thermal-oxidative degradation may release partial oxidation products, carbon dioxide and carbon monoxide.

SECTION VI. HEALTH HAZARD INFORMATION

TLV 100-150 ppm (See Sect II)

Butyl acetate is irritating to the eyes and mucous membranes after a brief inhalation exposure at 200-300 ppm. High concentrations or prolonged exposures can produce narcosis. Systemic effects may cause headache, drowsiness and unconsciousness. Chronic toxicity properties have not been adequately determined. (Kidney and liver damage are reported in animal studies.)

Skin contact can defat the skin, and repeated or prolonged contact can cause irritation and dermatitis. Ingestion will cause irritation of the mouth and digestive tract and is expected to cause CNS depression; one ounce may be sufficient to produce severe poisoning.

FIRST AID:

Eye Contact: Flush eyes thoroughly for 15 min. with water, including under the eyelids.

Get medical attention.

Skin Contact: Remove contaminated clothing. Flush affected areas with water.

Inhalation: Remove to fresh air. Restore and/or support breathing as needed. Have trained person give oxygen if breathing is difficult. Get medical attention.

Ingestion: Give 3 glasses milk or water to drink. Contact physician. Induce vomiting if medical help is not readily available and victim is conscious and alert.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel of major spills. Provide ventilation and remove sources of heat & ignition. Clean-up personnel need protection against contact with liquid and inhalation of vapors. Contain and collect large spills if safe. Collect small spills and residues on absorbent solids. Pick up using nonsparking tools and place in a closed metal container. Remove for safe evaporation, burning or landfill.

Spills can be flushed with water to remove from hazardous area; flush to ground or retention area for collection or evaporation. Prevent discharge into sewers, drains waterways or enclosed areas!

DISPOSAL: Burn scrap liquid by atomizing into an approved incinerator. Follow Federal, State and Local regulations. EPA(CWA) RQ 50001b [40CFR117] AQUATIC TOXICITY TLm 96: 100-10 ppm

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide adequate general and local exhaust ventilation (explosion-proof) to keep workplace air concentrations below the TLV and at less than 25% of LEL. Floor level and sump ventilation requires attention.

A chemical cartridge respirator with a full facepiece and an organic vapor cartridge provides limited time protection below 1000 ppm vapors. Wear a self-contained breathing apparatus with full facepiece for nonroutine or emergency use.

Wear protective clothing, including rubber gloves, apron, etc. to avoid skin contact and safety goggles and/or faceshield to protect the eyes from splashes. Additional protection such as safety shoes and boots may be needed for specific work conditions.

Eyewash fountains and washing facilities should be available in areas of use and handling.

Provide safety showers where large amounts are used. Solvent wet clothing should be promptly removed (fire and health hazard) and well dried or laundered before reuse.

Preclude from exposure workers with skin, kidney, liver or respiratory disorders until approved for work exposure by physician.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store closed containers in a clean, cool, well ventilated area away from oxidizing agents and sources of heat or ignition. Containers should be protected from physical damage and bonded and grounded for transfers to avoid static sparks. Meet codes for electrical services. Storage and use areas should be NO SMOKING areas. Use non-sparking type tools. Small amounts of butyl acetate should be handled in approved safety cans with proper labeling. Handle as an OSHA Class IC flammable liquid.

Avoid skin and eye contact. Avoid breathing vapors. Do not ingest. Wash thoroughly after handling. Use only with good ventilation.

DOT Classification: FLAMMABLE LIQUID I.D. No. UN 1123 Label: FLAMMABLE LIQUID

DATA SOURCE(S) CODE: 1-12, 14, 16, 23, 27, 31, 34, 37, 38, 43, 45, 47-49

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APPROVALS: MIS/CRD

INDUST. HYGIENE/SAFETY

MEDICAL REVIEW

15 June 1984

MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION
1145 CATALYN STREET
SCHENECTADY, NY 12303-1836 USA
(518) 377-8855



No. 410

CARBON TETRACHLORIDE

Revision A

Date December 1980

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: CARBON TETRACHLORIDE
OTHER DESIGNATIONS: Tetrachlormethane, Perchlormethane, Methane Tetrachloride,
CCl₄, GE Material D5B50, CAS #000 056 235
MANUFACTURER: Available from several suppliers, including:
Linden Chemicals & Plastics
PO Drawer J, Phone: (314) 843-1310
Moundsville, WV 26041

SECTION II. INGREDIENTS AND HAZARDS

Carbon Tetrachloride

%
ca 100

HAZARD DATA

8-hr TWA 5 ppm (skin)
or 30 mg/m³*

Human, oral
LD₅₀ 43 mg/kg

Human, inhalation
LC₅₀ 1000 ppm
TC₅₀ 20 ppm (CNS)

Hamsters and mice have
developed cancer on
long term feeding.

*ACGIH (1980 Intended Changes List). OSHA 8-hr TWA is
10 ppm. NIOSH has proposed a 10-hr TWA of 2 ppm.
ACGIH and NIOSH recommend labeling as a suspected human
carcinogen.
(skin) notation indicates absorption through the skin
can contribute significantly to overall exposure.

SECTION III. PHYSICAL DATA

Boiling point at 1 atm, deg C	--- 76.7	Specific gravity, 25/4 C	--- 1.585
Vapor pressure @ 20 C, mm Hg	---- ca 91	Melting point, deg C	----- -23
Vapor density (Air=1)	----- 5.3	Volatiles, %	----- ca 100
Solubility in water @ 20 C, wt %	- 0.08	Molecular weight	----- 153.8

Appearance & Odor: A clear, colorless liquid with a characteristic sweetish odor.
Odor recognition threshold (100% of test panel): 21.4 ppm in air when prepared from
CS₂; 100 ppm in air when prepared from CH₄. Odor may not be objectionable at acutely
toxic levels.

SECTION IV. FIRE AND EXPLOSION DATA

LOWER UPPER

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air

Extinguishing Media: It is nonflammable. Use that which is appropriate for the sur-
rounding fire. Use water spray to cool fire-exposed containers.

When involved in a fire situation, this material will emit highly toxic and
irritating fumes and gases. Metals, such as aluminum and magnesium, can
react violently with carbon tetrachloride when hot or burning.

Firefighters must wear self-contained breathing apparatus and full protective
gear to fight fires involving this material.

SECTION V. REACTIVITY DATA

This material is stable under normal conditions of handling and use. It does not
polymerize.

Thermal-oxidative decomposition will produce toxic, corrosive fumes, including
phosgene and hydrogen chloride.

Violent reactions or explosions can occur with incompatible materials, such as barium,
lithium, sodium, and potassium metal, powdered aluminum, magnesium, dimethylformamide
(above 65 C), fluorine, etc. (See NFPA, "Manual of Hazardous Chemical Reactions".)

SECTION VI. HEALTH HAZARD INFORMATION

TLV 5 ppm (skin) (See Sect. II)

Carbon tetrachloride is highly toxic and irritating by inhalation and ingestion (mean lethal dose is 5-10 ml). It is toxic by skin absorption. Excessive exposure may result in CNS depression and/or gastrointestinal symptoms.* It is irritating to skin and eyes. Eye contact or systemic effects can produce visual disturbances (haze, blind spots, narrowing of visual field, etc.). Skin contacts can cause defatting & dermatitis.

Kidney & liver damage can occur from severe acute or chronic exposure. It is a suspected carcinogen in humans.

FIRST AID:

Eye Contact: Flush eyes with running water for 15 minutes, including under the eyelids. Get medical help if irritation persists or when visual disturbances occur.

Skin Contact: Remove contaminated clothing promptly. Wash exposed skin with soap and water. Get medical help for repeated or gross exposures.

Inhalation: Remove to fresh air. Restore and/or support breathing; have qualified person administer oxygen if needed. Get medical help.

Ingestion: Contact physician for gastric lavage. (If medical help and advice is not readily available, give water to drink and induce vomiting.)

*Also cardiac arrhythmias.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel when large spills occur. Evacuate area. Provided maximum exhaust ventilation. Clean-up personnel must use protection against contact and inhalation (see Sect. VIII). Contain spill; pick up liquid for disposal. Small spills and residues can be absorbed on paper, vermiculite, etc. and allowed to evaporate in a hood. Prevent release of CCl_4 to surface water or sewers. Spills or discharges in 24 hours of 5000 lb or more (proposed RQ* is 1000 lb) must be reported to U.S. Government.

DISPOSAL: Consider recovery and reuse, if feasible. Scrap may be burned in approved, high temperature incinerator with scrubber or it may be disposed of as hazardous waste (EPA number U211 or F001 as a spent degreasing solvent under RCRA). Follow Federal, State and Local regulations.

*Reportable Quantity.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation to meet TLV. Exhaust hoods need 100 lfpm min. face velocity. Ventilate sumps and low lying areas. Use air-supplied or self-contained respirators above TLV, with full face piece above 100 ppm.

PVA or neoprene gloves and protective clothing needed to prevent skin contact. Wear safety goggles and/or face shield for eye protection.

An eyewash station and chemical safety shower should be readily accessible.

Provide preplacement and twice a year medical exams. Workers with obesity, diabetes, alcoholism or pulmonary problems should have a physician's approval before working with CCl_4 . Retain medical records for 30 years after termination of employment.

Provide training to those exposed to CCl_4 in the workplace. Monitor vapor levels in the workplace.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store in closed containers in a cool, dry, well-ventilated, low fire-risk area. Protect containers against physical damage. Keep away from sources of heat, direct sunlight, and incompatible materials (see Sect. V). Prevent exposure of vapors to high temperature to prevent decomposition to toxic and corrosive gases and vapors. No smoking in areas where vapors may be present. Prevent contact with the skin or eyes. Avoid exposure to vapors. Use good personal hygiene.

CCl_4 toxicity is markedly increased by the synergistic effects of alcohol. When possible, substitute a less hazardous solvent for CCl_4 . DOT Classification - ORM-A

DATA SOURCE(S) CODE: 1-12, 15, 16, 21-26, 31, 37, 38, 43

APPROVALS: MIS
CRD

Industrial Hygiene
and Safety

MEDICAL REVIEW: 16 Dec. 1980

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MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION

1145 CATALYN ST., SCHENECTADY, NY 12303 USA (518) 377-8854



MSDS # 537

CYCLOHEXYLAMINE

Issued: May, 1985

Revised:

From Genium's MSDS Collection, to be used as a reference.

R

SECTION 1. MATERIAL IDENTIFICATION

MATERIAL NAME: CYCLOHEXYLAMINE

Other Designations: Cyclohexanamine, Aminocyclohexane, Hexahydroaniline; $\text{CH}_2(\text{CH}_2)_4\text{CHNH}_2$; CAS #000 108 918.

Manufacturers: Available from many suppliers including:

Monsanto Company
800 N. Lindbergh Blvd.
St. Louis, MO 63167
(314) 694-1000



SECTION 2. INGREDIENTS AND HAZARDS

CYCLOHEXYLAMINE

%

HAZARD DATA

ca.100

8 hr TWA, 10 ppm or

40 mg/m³* (Skin)**

Rats, oral LD50:

710 mg/kg

Rabbit, dermal LD50:

631 mg/kg

* Current ACGIH TLV/TWA.

** The notation "skin" indicates the possibility of cutaneous absorption.

OSHA PEL/TWA has not been established.

SECTION 3. PHYSICAL DATA

Boiling Point, 1 atm, deg °F (°C) ... 274.1 (134.5)

Volatiles, % ca 100

Vapor pressure @ 30°C, mmHg 15

Evaporation Rate (Ether=1) ... 82.9

Vapor density (Air = 1) 3.42

Molecular Weight 99.17

Solubility in Water Complete

Melting Point, deg F(C) -0.2 (-17.7)

Specific Gravity, 20/4°C 0.819

Appearance & Odor: Colorless to yellow liquid with an unpleasant, fishy odor.

SECTION 4. FIRE AND EXPLOSION DATA

Lower

Upper

Flash Point and Method

Autoignition Temp.

Flammability Limits in Air

90°F (32.2°C) O.C.

560°F (293°C)

Extinguishing Media: Carbon dioxide, dry chemical, alcohol type foam. Do not use a solid stream of water, since the stream will scatter and spread the fire. Use water spray to cool tank/container.

Cyclohexylamine is a dangerous fire hazard when exposed to heat or flame. Its vapors are heavier than air and may travel considerable distance to source of ignition and flashback.

Firefighters should wear self-contained breathing apparatus and full protective clothing to prevent bodily contact.

SECTION 5. REACTIVITY DATA

Cyclohexylamine is stable in closed containers under normal storage and use conditions. It does not undergo hazardous polymerization.

This flammable liquid can react vigorously with oxidizing materials. It is incompatible with acids, all copper alloys and lead.

When Cyclohexylamine is heated to decomposition, it emits highly toxic oxides of nitrogen.

SECTION 6. HEALTH HAZARD INFORMATION

TLV 10 ppm (See Section 2)

Cyclohexylamine vapors are irritating to the mucous membranes, skin and eyes. Concentrations in air above 150 ppm are extremely irritating to the upper respiratory tract and eyes and may cause corneal opacity. The liquid is a strong base and will burn the skin and severely damage the eyes on contact. It may be absorbed through the skin and cause skin sensitization. Systematic effects of overexposure through inhalation, ingestion, or skin absorption include drowsiness, dizziness, anxiety, restlessness, nausea and vomiting. Deichman and Gerarde report that Cyclohexylamine is a weak methemoglobin forming substance (decreases oxygen carrying capacity) with cumulative properties capable of producing poisoning. Long-term exposure may cause weight loss and corneal opacity.

FIRST AID: EYE CONTACT: Promptly flush eyes, including under eyelids, with running water for at least 15 minutes. If irritation persists or damage is observed, cover eyes with a dry bandage and transport to a medical facility that treats eye injuries. **SKIN CONTACT:** Promptly flush skin for at least 15 minutes while removing contaminated clothing. If skin is burned, cover with a dry, sterile bandage and get medical attention (In-plant, Paramedic, Community). **INHALATION:** Remove to fresh air. Restore and/or support breathing if necessary. Get medical attention. **INGESTION:** Give victim water or milk as quickly as possible. Get medical attention and call a Poison Control Center. Don't induce vomiting unless directed to do so. Transport victim to a medical facility. Never give anything by mouth to a person who's unconscious or having convulsion.

SECTION 7. SPILL, LEAK AND DISPOSAL PROCEDURES

Notify safety personnel of large spills or leaks. Evacuate the area if necessary. Provide MAXIMUM explosion-proof ventilation. Remove all heat and ignition sources. Clean-up personnel should wear self-contained breathing apparatus and full protective clothing including boots. Absorb small spills on paper towel or vermiculite and place in a closed container for disposal. Dike large spills and collect for reclamation or disposal. Do not flush to sewer. Use non-sparking tools when picking up spills.

DISPOSAL: Incinerate or place in a suitable container for disposal by licensed contractor. Follow all federal state and local regulations.

SECTION 8. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust (explosion-proof) to meet TLV requirements. Use an appropriate NIOSH approved respirator for emergencies or non-routine exposures where the TLV may be exceeded. All electrical service in use or storage areas should have an "explosion proof" design.

Wear safety goggles where splashing is possible. Wear gloves, face shield, and impervious clothing to prevent skin contact where skin contact may occur. If liquid gets on the skin, the exposed area should be drenched with water immediately. Do not wear contaminated clothing until it has been properly cleaned.

Safety showers and eye wash stations should be located near use or handling areas.

Contact lenses pose a special hazard; soft lenses may absorb and all lenses concentrate irritants.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Store in a cool, dry, well-ventilated area away from acids, copper alloys, lead, oxidizing agents and ignition sources. Keep container tightly closed. Ground and bond containers and equipment when transferring liquid to prevent static sparks. Do not smoke in handling or user areas, wash thoroughly after handling.

DOT Classification: Flammable liquid, Corrosive; UN 2357.

DATA SOURCE(S) CODE (See Glossary) 1-9, 12, 14, 25, 26, 34, 37, 48, 63, 66, 69, 70, 71, 73, 74, 75.

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APPROVALS

INDUST. HYGIENE/SAFETY

MEDICAL REVIEW:

1145 CATALYN ST., SCHENECTADY, NY 12303 USA (518) 377-8854

MSDS # 566
DIMETHYLAMINO ETHANOL

Issued: December 1985
Revised:

From Genium's MSDS Collection, to be used as a reference.

18

OTHER DESIGNATIONS: n-Dimethylamino Ethanol, N,N-Dimethylamino Ethanol, 2-Dimethylamino Ethanol, Beta-Dimethylaminoethyl Alcohol, Dimethylethanolamine, N,N-Dimethylethanolamine, N,N-Dimethyl-2-Hydroxyethylamine, beta-Hydroxyethyl dimethylamine, $C_4H_{11}NO$; CAS 0108 01 0.

MANUFACTURER/SUPPLIER: Air Products and Chemicals, Inc., Box 538, Allentown, PA 18105
(800) 523-9374 (except PA).

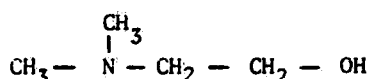
%

HAZARD DATA

DIMETHYLAMINO ETHANOL

ca 100

No TLV established.



Dimethylamino Ethanol is not listed as a carcinogen by NTP, IARC or OSHA.

Rat, oral LD₅₀:
2340 mg/kg
Rabbit, skin LD
1370 mg/kg

Rabbit, skin:
445 mg open MLD

Rabbit, eye:
750 mg SEV

SECTION 3. PHYSICAL DATA

Boiling point, 1 atm 273°F (134°C)

Vapor pressure @ 20°C, mm Hg . . . 8

Vapor density (Air=1) 3.03

Solubility in water Complete

Specific gravity @ 20/4°C 0.8866

% Volatile by Volume ca 100

Evaporation rate (BuAc=1) ... >1

Refractive Index @ 20°C 1.4300

Molecular weight 89.11

APPEARANCE & ODOR: Colorless hygroscopic liquid with a strong amine odor.

SECTION 4. FIRE AND EXPLOSION DATA

Lower

Upper

Flash Point and Method

Autoignition Temp.

Flammability Limits in Air

105°F (40.5°C) O.C.

540°F (282°C)

Data not available

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical, alcohol type foam. Do not use a solid stream of water since the stream will scatter and spread the fire. Use water spray to cool fire-exposed tanks/containers.

Dimethylaminoethanol is a moderate fire hazard when exposed to heat, sparks, or open flame. It can react vigorously with oxidizing materials. When involved in a fire, it emits oxides of nitrogen and carbon monoxide.

Firefighters should wear self-contained breathing apparatus and full protective clothing to prevent bodily contact.

SECTION 5. REACTIVITY DATA

This combustible liquid is stable in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization.

Dimethylaminoethanol is incompatible with oxidizing agents and strong acids.

Thermal decomposition or burning may produce toxic vapors and gases, including carbon monoxide and oxides of nitrogen.

SECTION 6. HEALTH HAZARD INFORMATION

TLV

None established

Vapors of dimethylamino ethanol may be irritating to the eyes, nose, and upper respiratory tract. Over-exposure to vapors is unlikely due to this compound's low vapor pressure and objectionable odor. If inhalation of vapor does occur, however, harmful effects may result. The liquid is corrosive to the skin and eyes. Contact with the eyes may cause permanent damage to the cornea. It may be absorbed through intact skin. If ingested, it will cause irritation or burns to the mouth, throat, and gastrointestinal tract. Dimethylamino ethanol may produce an allergic skin reaction in some individuals. Overexposure via inhalation, skin absorption or ingestion may cause CNS effects, weight loss, and cyanosis.

FIRST AID:

EYE CONTACT: Promptly flush eyes, including under eyelids, for at least 15 minutes with running water. If irritation persists or damage is observed, cover eyes with a dry bandage and transport to a medical facility that treats eye injuries. **SKIN CONTACT:** Promptly flush skin for at least 15 minutes while removing contaminated clothing. If skin is burned, cover with a dry, sterile bandage and get medical attention.

INHALATION: Remove to fresh air. Restore and/or support breathing as needed. Get medical attention.*

INGESTION: Give victim water or milk as quickly as possible. Contact a physician or Poison Control Center. Do not induce vomiting unless directed to do so. Never give anything by mouth to a person who is unconscious or is having convulsions. * GET MEDICAL ATTENTION = In Plant, Community, Paramedic

SECTION 7. SPILL, LEAK AND DISPOSAL PROCEDURES

Notify safety personnel of large spills or leaks. Remove all sources of heat and ignition. Provide maximum explosion-proof ventilation. Evacuate all personnel from the area, except those involved in cleanup. Remove leaking container to safe place if feasible. Cleanup personnel should wear protective clothing and equipment to prevent exposure to liquid and vapor.

Absorb small spills with paper towel or vermiculite and place in closed container for disposal. Dike large spills and collect for reclamation or disposal. Water spray can be used to dilute and flush spill if necessary, but do not flush to sewer, waterway, or watershed. Use non-sparking tools. Neutralize spill area with sodium bisulfite and collect wash water for disposal.

DISPOSAL: Place in closed container for disposal by licensed contractor or burn in an approved incinerator. Follow all Federal, State, and Local regulations.

SECTION 8. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation (explosion proof) to keep vapors and mists of dimethylamino ethanol to a minimum. For emergency or nonroutine exposures or when this material is being used in un-ventilated areas, wear an appropriate NIOSH-approved respirator. All electrical service in use or storage areas should have an "explosion-proof" design.

Prevent contact with skin and eyes. Splash goggles, gloves, faceshield, boots, impervious clothing, apron, and hard hat should be available and worn as appropriate. If contact does occur, the exposed area should be drenched with water immediately. Remove contaminated clothing and do not wear until it has been properly cleaned.

Safety showers and eyewash stations should be readily available in use and handling areas.

Contact lenses pose a special hazard; soft lenses may absorb and all lenses concentrate irritants.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Store in closed containers in a cool, dry, well-ventilated area away from acids, oxidizing agents and ignition sources. Protect containers from physical damage.

Avoid contact with eyes, skin, or clothing. Do not breathe vapors or mists. Use only with adequate ventilation. Wash thoroughly after handling and do not smoke in use or handling areas.

Ground and bond containers and equipment when transferring liquid to prevent static sparks. Use non-sparking tools. Avoid contact with zinc, copper, and copper alloys.

DOT CLASSIFICATION: Corrosive liquid, N.O.S. UN1760.

DATA SOURCE(S) CODE (See Glossary) 1, 4, 5, 7, 25, 75, 81. CR

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APPROVALS J O Accorcello, 3/86

INDUST. HYGIENE/SAFETY J W 3-86

MEDICAL REVIEW: J W Mar 86

Material Safety Data Sheet

From Genium's Reference Collection
Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8855



GENIUM PUBLISHING CORP.

No. 437
ETHYL ACETATE
(Revision A)

Issued: July 1980
Revised: April 1986

SECTION 1. MATERIAL IDENTIFICATION

21

MATERIAL NAME: ETHYL ACETATE

OTHER DESIGNATIONS: Acetic Ether, Acetidin, Acetoxyethane, Ethyl Acetic Ester, Ethyl Ethanoate, Vinegar Naptha, $C_4H_8O_2$, CAS #0141-78-6

MANUFACTURER/SUPPLIER:

Celanese Chemical Co., Inc., 1250 W. Mockingbird Lane, Dallas, TX 75247;
Telephone: (214) 689-4000
Union Carbide Corp., Solvents & Coatings Div., Bldg. K, Old Ridgebury Rd., Danbury, CT 06814; Telephone: (203) 794-2000

HMS

H: 1
F: 3 R 1
R: 0 I 2
PPE* S 2
*See Sect. 8 K 4



SECTION 2. INGREDIENTS AND HAZARDS

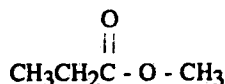
%

HAZARD DATA

Ethyl Acetate, CAS #0141-78-6

ca 100

8-hr. TWA: 400 ppm or
1400 mg/m³*



Human, Inhalation, TCLo:
400 ppm (Irritation)

Rat, Oral, LD₅₀:
11 gm/kg

Rat, Inhalation, LC₅₀:
1600 ppm/8 hrs.

* Current (1985-86) ACGIH TLV and OSHA PEL.

SECTION 3. PHYSICAL DATA

Boiling Point ... 171°F (77°C)
Vapor Pressure @ 20°C, mm Hg ... 76
@ 25°C, mm Hg ... 100
Water Solubility @ 20°C, wt. % ... 8.7
Vapor Density (Air = 1) ... 3.0

Evaporation Rate (BuAc = 1) ... 6
Specific Gravity (H₂O = 1) ... 0.902
Melting Point ... -117°F (-83°C)
Percent Volatile by Volume ... ca 100
Molecular Weight ... 88.1

Appearance and odor: Clear, colorless, volatile liquid with a characteristic, fruity, nonresidual odor. The odor recognition threshold (unfatigued) is 6.3 ppm.

SECTION 4. FIRE AND EXPLOSION DATA

LOWER

UPPER

Flash Point and Method

Autoignition Temp.

Flammability Limits in Air

24°F (-4.4°C) CC

800°F (427°C)

% by Volume

2.2

11

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical, alcohol type of foam, water fog. Do not use a solid stream of water because the stream will scatter and spread the fire. Use carbon dioxide or dry chemicals for small fires and alcohol type of foam or water fog for large fires. Cool fire-exposed tanks/containers with water spray. Use blanketing effect to smother fire.

UNUSUAL FIRE/EXPLOSION HAZARDS: This OSHA class IB flammable liquid is a dangerous fire hazard and a moderate explosion hazard when exposed to heat, sparks, or open flame. Its vapors are heavier than air and may travel a considerable distance to a source of ignition and flash back. Flammable mixtures with air are formed readily at room temperature.

SPECIAL FIRE-FIGHTING PROCEDURES: Fire fighters should wear self-contained breathing apparatus with facepieces and fully protective clothing when fighting fires involving ethyl acetate.

SECTION 5. REACTIVITY DATA

Ethyl acetate is stable in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization.

This material reacts vigorously with chlorosulfonic acid, lithium aluminum hydride and 2-chloromethyl furan, oleum, and potassium t-butoxide. Contact with nitrates, strong acids, strong oxidizers, or strong alkalies may cause fire or explosion. Avoid exposure to heat, sparks, or open flame.

Ethyl acetate will attack some forms of plastics, rubber, and coatings.

SECTION 6. HEALTH HAZARD INFORMATION

Ethyl acetate is not listed as a carcinogen by the NTP, IARC, or OSHA.

SUMMARY OF RISKS: Vapors of ethyl acetate are irritating to the eyes and respiratory tract at concentrations above 400 ppm. Exposure to excessive concentrations may cause headache and narcosis. Exposure of this nature is unlikely, however, because the irritating properties will cause workers to exit the area. The liquid is irritating to the skin and eyes. Repeated and/or prolonged contact with the skin has a defatting effect and may cause drying and cracking. Contact with the eyes may cause painful conjunctival irritation. Ingestion may cause headache, drowsiness, and unconsciousness. **TARGET ORGANS:** Chronic overexposure to ethyl acetate may cause anemia with leukocytosis and damage to liver and kidneys. The TLV of 400 ppm is believed to prevent systemic effects but may be irritating to some workers who are unaccustomed to the exposure.

FIRST AID: EYE CONTACT: Promptly flush eyes, including under the eyelids, for at least 15 minutes with running water. Get medical help if irritation persists.* **SKIN CONTACT:** Promptly flush exposed area with running water while removing contaminated shoes and clothing. Get medical help if irritation persists.* **INHALATION:** Remove victim to fresh air. Restore and/or support breathing as required. Get medical help.* **INGESTION:** Give victim one or two glasses of milk or water. Contact a poison control center. Do not induce vomiting unless directed to do so. Transport victim to a medical facility. Never give anything by mouth to a person who is unconscious or convulsing.

* **GET MEDICAL ASSISTANCE =** In plant, paramedic, community. Get medical help for further treatment, observation, and support after first aid.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel of large ethyl acetate spills or leaks. Remove all sources of heat and ignition. Provide maximum explosion-proof ventilation. Limit access to spill area to necessary personnel only. Remove leaking container to a safe place, if feasible. Persons involved in cleanup need protection against contact with liquid and inhalation of vapor (see sect. 8). Absorb small spills with paper toweling or vermiculite. Contain large spills and collect, if feasible, or absorb them with vermiculite or sand. Place waste solvent or absorbent into closed containers for disposal (using nonsparking tools). Water spray may be used to flush liquid away from sensitive areas. Do not flush ethyl acetate waste to a sewer, watershed, or waterway.

DISPOSAL: Place waste in a suitable container for disposal by a licensed contractor or burn it in an approved incinerator equipped with an afterburner and scrubber. Follow all Federal, state, and local regulations. Ethyl acetate is designated as a hazardous waste by the EPA. The EPA (RCRA) HW No. is U112 (40 CFR 261).

SECTION 8. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation to meet TLV requirements. Ventilation fans and other electrical service must be nonsparking and have an explosion-proof design. Exhaust hoods should have a face velocity of at least 100 lfm (linear feet per minute). For emergency or nonroutine exposures where the TLV may be exceeded, use an appropriate NIOSH-approved respirator.

Safety glasses or splash goggles should be worn in all work areas. Impervious gloves, apron, face shield, boots, and other protective clothing and equipment should be available and worn as necessary to prevent contact with skin, eyes, and clothing. Remove contaminated clothing immediately and do not reuse it until it has been properly laundered.

Eyewash stations and safety showers should be readily available in use or handling areas.

Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Store ethyl acetate in closed containers in a cool, dry, well-ventilated area away from oxidizing agents, heat, sparks, and open flame. Storage area must meet OSHA requirements for class IB flammable liquids. Protect containers from physical damage. Use this material only with adequate ventilation. Avoid contact with skin, eyes, and clothing. Do not inhale or ingest it.

Wash thoroughly after handling it. Ground and bond metal containers and equipment when transferring ethyl acetate to prevent static sparks. Do not smoke in areas where this material is handled or stored.

Store small amounts of liquid material in metal safety cans. Keep only limited quantities of ethyl acetate in the work area. Do not allow concentrations greater than 25% of the lower flammability limit in confined areas. Individuals who work with ethyl acetate should be given preplacement and periodic physical examinations with emphasis on blood studies, lungs, and kidney and liver function.

Emptied containers retain product residues; handle them accordingly!

DOT Classification: Flammable Liquid

DOT No. UN1173

Data Source(s) Code: 1-12, 14, 18, 20, 23, 25, 27, 34, 59, 81. CR

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Approvals *J. O. Accorso, 1/87.*

Indust. Hygiene/Safety *JW 1-87*

Medical Review *[Signature] Jan 87*

MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION

1145 CATALYN ST., SCHENECTADY, NY 12303 USA (518) 377-8854



MSDS # 324

ISOPROPYL ALCOHOL

Revision D

Issued: October 1982

Revised: September 1985

From Genium's MSDS Collection, to be used as a reference.

SECTION 1. MATERIAL IDENTIFICATION

18

MATERIAL NAME: ISOPROPYL ALCOHOL

OTHER DESIGNATIONS: Isopropanol, 2-Propanol, sec-Propyl Alcohol, Dimethyl Carbinol, Isohol, Petrohol, IPA, C₃H₈O, CAS # 0067 63 0

MANUFACTURER/SUPPLIER: Available from several sources, including:

Allied Corporation

PO Box 2064R

Morristown, NJ 07960 (201) 455-4400 - (800) 631-8050



SECTION 2. INGREDIENTS AND HAZARDS

ISOPROPYL ALCOHOL

* Current OSHA PEL and ACGIH TLV (1985-86).

The ACGIH STEL is 500 ppm, 1225 mg/m³.

NIOSH has recommended a 15-minute ceiling of 800 ppm.

NOTE: NTP and IARC list CAS #0067-63-0, "isopropyl alcohol manufacture (strong acid process)" as a human carcinogen. We believe this refers to the process and not necessarily the product. Check with your suppliers.

%

ca 100

HAZARD DATA

8-hr TWA: 400 ppm or 980 mg/m³*

Human, Eye: 20 ppm

Primary irritation dose

Human, Inhalation:

400 ppm: IRR

Man, Oral LDLo:

8600 mg/kg

Rat, Oral:

5840 mg/kg

SECTION 3. PHYSICAL DATA

Boiling point, 1 atm 180°F, (82°C)

Vapor pressure @ 20°C, mmHg ... 33

Vapor density (Air=1) 2.07

Viscosity, 20°C, cps 2.4

Solubility in water Completely soluble

Specific gravity (H₂O=1) 0.786

Melting point -127.3°F (-88.5°C)

% Volatile by volume, 20°C ... ca 100

Evaporation rate (CCl₄=1) 2.6

Molecular weight 60.11

APPEARANCE & ODOR: Clear, colorless liquid with a slight non-residual alcohol type odor.

Threshold odor concentration, 100% recognition by test panel, is 28.2 ppm.

SECTION 4. FIRE AND EXPLOSION DATA

Lower

Upper

Flash Point and Method

Autoignition Temp.

Flammability Limits in Air

53°F (11.7°C) closed cup

750°F (399°C)

% by volume

2.0

12.0

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical, alcohol foam. Use water spray to cool fire-exposed tanks, containers. A fine water mist may be used to smother fire or to disperse vapors. Do not use a solid stream of water since the stream will scatter and spread the fire.

Isopropyl alcohol is an OSHA Class IB flammable liquid. It is a dangerous fire hazard and a moderate explosion hazard when exposed to heat, flames or oxidizers. At 20°C, the vapor space (saturated) above isopropyl alcohol contains about 4.3 volume % of vapor. Vapors are heavier than air and may travel a considerable distance to an ignition source and flashback. Firefighters should wear self-contained breathing apparatus and full protective clothing when fighting fires involving this material.

SECTION 5. REACTIVITY DATA

This material is stable in closed containers at room temperature under normal storage and handling conditions. It does not polymerize. Isopropyl alcohol is incompatible with acetaldehyde, chlorine, ethylene oxide, hydrogen-palladium combination, hydrogen peroxide-sulfuric acid combination, potassium tert-butoxide, hypochlorous acid, isocyanates, nitroform, phosgene, oleum, perchloric acid, and strong oxidizing agents. Do not store isopropyl alcohol in aluminum containers.

Thermal-oxidative degradation products can include carbon monoxide.

SECTION 6. HEALTH HAZARD INFORMATION

TLV 400 ppm (see Section 2)

At 400 ppm, vapors of isopropanol (IPA) may cause mild irritation of the eyes, nose, and throat. Prolonged exposures above the TLV may cause nausea, headache, and mild narcosis. The liquid is irritating to the eyes and produces intense stinging and burning. If not promptly removed, IPA may cause eye damage. Repeated or prolonged contact with the skin may cause irritation and dermatitis. While toxic skin absorption is unlikely, it should be considered in meeting the TLV. Ingestion of IPA will cause burning of the gastrointestinal tract, nausea, vomiting, bleeding, CNS depression, hemolysis, and pulmonary damage. Ingestion of as little as 10 ml may cause serious injury, while ingestion of 100 ml can be fatal. The single lethal dose for an adult is approximately 250 ml. The TLV for this material is set on the basis of eye, nose, and throat irritation. IPA has good warning properties.

FIRST AID: EYE CONTACT: Flush eyes, including under eyelids, with running water for at least 15 minutes. Get medical attention (Inplant, community, paramedic). SKIN CONTACT: Flush exposed area with water while removing contaminated clothing. Get medical attention if irritation persists. INHALATION: Remove victim to fresh air. Restore and/or support breathing as required. Get medical help. INGESTION: Give victim milk or water. Induce vomiting by sticking finger to back of throat. Contact a physician or Poison Control Center. Never give anything by mouth to a person who is unconscious or is having convulsions.

SECTION 7. SPILL, LEAK AND DISPOSAL PROCEDURES

Notify safety personnel of large spills or leaks. Remove all sources of heat and ignition. Provide maximum explosion-proof ventilation. Evacuate all personnel from area, except for those involved in clean-up. Remove leaking container to safe place if feasible. Clean-up personnel need protection against liquid contact and vapor inhalation. Absorb small spills with paper towels, evaporate flammable alcohol in exhaust hood and burn dry paper. Contain large spills and collect liquid, if feasible, or absorb with vermiculite or sand. Place waste or absorbent into closed container (using non-sparking tools) for disposal. Water spray can be used to dilute and flush spill if necessary, but do not flush to water course or to sewer or enclosed area.

DISPOSAL: Burn waste liquid in an approved incinerator or dispose of via licensed waste disposal company. Absorbed liquid can be landfilled. Follow Federal, State and Local regulations.

AQUATIC TOXICITY TLM 96: 1000-100 ppm.

SECTION 8. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation (explosion proof) to meet TLV requirements. For emergency or nonroutine exposures where the TLV may be exceeded, use an appropriate NIOSH approved respirator. Fume hoods should have a minimum face velocity of 100 lfm. All electrical service in use or storage areas should have an explosion-proof design. Wear impervious gloves and safety glasses to prevent contact with the skin and eyes. If repeated or prolonged contact with liquid or mist is likely, wear protective clothing including boots, apron, and face-shield or splash goggles. Remove contaminated clothing immediately and do not reuse until it has been properly laundered.

Eye wash stations and safety showers should be available in use and handling areas.

Contact lenses pose a special hazard; soft lenses may absorb and all lenses concentrate irritants.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Store in closed containers in a cool, dry, well-ventilated area away from oxidizers, heat, sparks, and open flame. Protect containers from physical damage.

Use only with adequate ventilation. Avoid inhalation of vapor and repeated or prolonged contact with the skin. Remove contaminated clothing immediately. Wash thoroughly after handling.

Ground and bond containers and equipment when transferring or pouring liquid. Use non-sparking tools.

Do not eat or smoke in areas where this material is being used or handled.

DOT CLASSIFICATION: Flammable liquid.

DOT I.D. NO.: UN1219

DATA SOURCE(S) CODE (See Glossary) 1-12, 19, 20, 23, 26, 31, 34, 37, 39, 43, 47, 59, 79.R.

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APPROVALS

JO. Accrocco, 11/85

INDUST. HYGIENE/SAFETY

11-85

MEDICAL REVIEW:

Dec 85

MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION

1145 CATALYN ST., SCHENECTADY, NY 12303 USA (518) 377-8854



MSDS # G 354

METHYL ALCOHOL
Revision C

Issued:

Revised: September, 1985

From Genium's MSDS Collection, to be used as a reference.

SECTION 1. MATERIAL IDENTIFICATION

17

MATERIAL NAME: METHYL ALCOHOL

OTHER DESIGNATIONS: Methanol, Wood Alcohol, Carbinol, Wood Naphtha, Methyl Hydroxide, Monohydroxy Methane, CH₃OH, CAS #67-56-1

MANUFACTURER/SUPPLIER: Available from several suppliers, including: E.I. DuPont DeNemours & Co. (302- 774-2290 Chemicals & Pigments Dept (800) 441-9442 1007 Market St. Wilmington, DE 19898



SECTION 2. INGREDIENTS AND HAZARDS

METHYL ALCOHOL



* Current OSHA Standard; ACGIH (1985-86) TLV adds (skin) notation.

NIOSH has recommended a TWA standard of 200 ppm with a fifteen minute ceiling of 800 ppm. This ceiling is well above the TLV STEL of 250 ppm.

%

ca 100

HAZARD DATA

8 hr TWA: 200 ppm, or
260 mg/m³ (Skin)
STEL: 250 ppm, or
310 mg/m³

HUMAN

Eye: 5 ppm, primary
irritation dose

Oral: LDLo: 340 mg/kg

Inhalation: TCLo: 86,000
mg/m³ - Toxic irritant
effects (systemic)

SECTION 3. PHYSICAL DATA

Boiling Point, 1 atm 148.5°F (64.7°C)

Vapor density (Air=1) 1.11

Vapor pressure @ 21°C, mmHg ... 100
@ 50°C, mmHg ... 400

Water Solubility Totally Miscible

Viscosity @ 20°C, cps 0.59

Specific gravity, 20°/4°C ... 0.791

Melting point -144°F (-97.8°C)

Volatiles, % ca 100

Evaporation rate (BuAc=1) ... 5.9

Molecular weight 32.04

APPEARANCE & ODOR: Clear, colorless, highly polar liquid with a characteristic alcohol odor. The odor recognition threshold (100% of test panel) is 53.3 ppm

SECTION 4. FIRE AND EXPLOSION DATA

Lower

Upper

Flash Point and Method

Autoignition Temp.

Flammability Limits in Air

60.8°F (12°C) Closed Cup

725°F (385°C)

% by Volume

6

36.5

EXTINGUISHING MEDIA: Use carbon dioxide, dry chemical, or alcohol type foam. Do not use a solid stream of water since the stream will scatter and spread the fire. Use water spray to cool fire-exposed tanks/containers. Fires involving Methyl Alcohol are Class IB; use a blanketing effect to smother fire. Methyl Alcohol is a moderate explosion hazard and a dangerous fire hazard when exposed to heat, sparks, flame or oxidizers. Its vapors are heavier than air and may travel a considerable distance to an ignition source and flashback. Firefighters should wear self-contained breathing apparatus and full protective clothing when fighting fires involving Methyl Alcohol.

SECTION 5. REACTIVITY DATA

Methyl Alcohol is stable in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization. This material may react violently with chromic anhydride; iodine plus ethyl alcohol, and mercuric oxide; lead perchlorate; perchloric acid plus ethyl alcohol; dimethyl formamide plus phosphorous; potassium hydroxide plus chloroform; sodium hydroxide plus chloroform. It may also react with metallic aluminum at high temperatures.

Methyl Alcohol is incompatible with strong oxidizing agents (eg., nitrates, perchlorate or sulfuric acid), active metals, acetaldehyde, ethylene oxide, isocyanates, beryllium dihydride, chloroform, and potassium tert-butoxide. It may attack some forms of plastics and rubber. Thermal decomposition or burning will produce carbon monoxide, carbon dioxide and possible toxic formaldehyde and unburned methanol.

SECTION 6. HEALTH HAZARD INFORMATION

TLV 200 ppm (skin) or 260 mg/m³

Methanol is a poisonous, narcotic chemical that may exert its effects through inhalation, skin absorption, or ingestion. Elimination of Methanol from the body is slow, and the toxic effects can be compounded by repeated excessive exposures over several days. Toxic effects are exerted upon the CNS, especially the optic nerve and possibly the retinae. Symptoms of overexposure include dizziness, visual impairment, nausea, respiratory failure, muscular incoordination and narcosis. Visual disturbances may clear temporarily then re-occur and progress to blindness. Prolonged or repeated contact with the skin may cause dermatitis, erythema, and scaling. Vapors of Methanol are mildly irritating to the eyes, while direct contact with the liquid may cause irritation, pain and transient corneal opacity. Ingestion of Methanol can cause blindness and death. The fatal dose is 100-250 ml, although death from ingestion of less than 33 ml has been reported.

FIRST AID: EYE CONTACT: Immediately flush eyes, including under eyelids, with plenty of running water for at least 15 minutes. Get medical attention if irritation persists. SKIN CONTACT: Flush exposed area with water while removing contaminated clothing. Wash with soap and water. Get medical attention if irritation persists.

INHALATION: Remove victim to fresh air. Restore and/or support breathing as needed. Get medical help (Inplant Paramedic, community). INGESTION: Give victim 5-4 glasses of water or milk and induce vomiting by sticking finger to back of throat. Contact a Poison Control Center or physician. Transport victim to a medical facility immediately. Do not induce vomiting or give anything to drink if victim is unconscious or having convulsions. Get medical attention (Inplant, paramedic, community).

SECTION 7. SPILL, LEAK AND DISPOSAL PROCEDURES

Notify safety personnel of large spills or leaks. Remove all sources of heat and ignition. Provide maximum explosion-proof ventilation. Evacuate all personnel from the area except for those involved in clean-up. Remove leaking container to safe place if feasible. Clean-up personnel should wear protective clothing, gloves, boots, and a self-contained breathing apparatus. Absorb small quantities on paper towel, vermiculite, or other absorbent and place in closed container for disposal. Dike large spills and collect for reclamation or disposal. Water spray may be used to knock down vapor and to dilute and flush spill away from sensitive areas. Do not flush to sewer. Keep out of watersheds and waterways.

DISPOSAL: Place in suitable container for disposal by a licensed contractor or burn in an approved incinerator. Waste solvent may be reclaimed via filtration and distillation procedures. Methyl Alcohol has been designated as a hazardous waste by the EPA (RCRA CFR 261.33). The EPA Hazardous Waste No. is U154. Aquatic Toxicity Rating: Tlm96: Over 1000 ppm.

SECTION 8. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation (explosion-proof) to meet TLV requirements. For emergency or non-routine exposures where the TLV may be exceeded, wear an appropriate NIOSH-approved respirator. All electrical service in use or storage areas should have an explosion-proof design. Prevent skin and eye contact by wearing rubber gloves and splash goggles or safety glasses. Use protective aprons, boots and face shield as necessary when splashing may occur. Eyewash stations and safety showers should be available in areas of use and handling. Provide suitable training to those working with Methanol. Monitor the workplace and keep accurate records.

Contact lenses pose a special hazard; soft lenses may absorb and all lenses concentrate irritants.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Store in tightly closed containers in a dry, well-ventilated area away from strong oxidizing agents, heat, sparks and open flame. Protect container from physical damage. When transferring or pouring Methyl Alcohol, ground and bond containers and equipment to prevent static sparks. Use non-sparking tools. Do not smoke in areas of use or storage. Use with adequate ventilation. Do not breathe vapors. Avoid contact with eyes and skin. This material is poisonous when introduced into the body metabolism. **DO NOT INGEST!!!** Provide preplacement medical exams and periodic medical surveillance for industrially exposed workers with emphasis on neurological and visual functions, liver, and kidney systems.

DOT CLASSIFICATION: Flammable liquid, UN1230

DOT LABEL: Flammable liquid.

DATA SOURCE S: CODE (See Glossary) 1, 2, 4-12, 16, 19, 20, 23-26, 31, 34, 37-39, 43, 47, 63, 79, R.

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APPROVALS

J. C. R. 11/85

INDUST. HYGIENE/SAFETY

J. W. 11-85

MEDICAL REVIEW:

Dec 85

Material Safety Data Sheet

Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8855



No. 302
METHYL n-AMYL KETONE
(Revision C)

Issued: September 1979
Revised: March 1986

SECTION 1. MATERIAL IDENTIFICATION

20

MATERIAL NAME: METHYL n-AMYL KETONE

OTHER DESIGNATIONS: 2-Heptanone, n-Amyl Methyl Ketone, Methyl Pentyl Ketone, $\text{CH}_3\text{CO}(\text{CH}_2)_4\text{CH}_3$,
CAS #0110-43-0

MANUFACTURER/SUPPLIER: Available from several suppliers, including:
Ashland Chemical Co., Industrial Chemicals & Solvents Div., PO Box 2219,
Columbus OH 43216; Telephone: (614) 889-3844
Union Oil Co. of California, Union Chemical Div., 19005 Golf Rd.,
Schaumburg, IL 60103; Telephone: (312) 490-2500

HMIS

H: 1

F: 2

R: 1

PPE*

*See sect. 8



SECTION 2. INGREDIENTS AND HAZARDS

%

HAZARD DATA

Methyl n-Amyl Ketone ($\text{C}_7\text{H}_{14}\text{O}$)

ca 100

8-hr TWA 100 ppm*
or 465 mg/m^3

Rat, Oral, LD_{50} : 1.67 g/kg

Rabbit, Skin, LD_{50} : 12.6 g/kg

* Current OSHA PEL. NIOSH (1978) recommended a 10-hr TWA of 100 ppm
with an action level of 50 ppm; ACGIH (1985-86) TWA is 50 ppm or
235 mg/m^3 .

Rat, Inhalation, LCLo:
4000 ppm/4 hrs.

SECTION 3. PHYSICAL DATA

Boiling Point, 1 atm ... 304°F (151°C)
Vapor Pressure @ 20°C, mm Hg ... 2.6
Vapor Density (Air = 1) ... 3.9
Solubility in Water @ 20°C, wt. % ... 0.43

Specific Gravity 15/4°C ... 0.82
Evaporation Rate (BuAc = 1) ... 0.4
Melting Point ... -31°F (-35°C)
Molecular Weight ... 114.21

Appearance and odor: Clear, colorless liquid with fruity, bananalike odor. Good warning properties.

SECTION 4. FIRE AND EXPLOSION DATA

LOWER

UPPER

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air	1.11	7.9
120°F (49°C) Open Cup	991°F (532°C)	% by Volume		

EXTINGUISHING MEDIA: Dry chemical, CO_2 , or foam. Do not use a solid stream of water that may scatter the flames. Use a water spray to cool metal containers exposed to fire.

This combustible liquid can form explosive mixtures with air when heated. Vapors can flow along surfaces to distant ignition sources and flash back.

Self-contained breathing apparatus is required for those fighting fires in enclosures in which this material is involved.

SECTION 5. REACTIVITY DATA

Methyl n-amyyl ketone is a stable material in closed containers at room temperature under normal storage and handling conditions. It does not polymerize.

This material is an OSHA class II combustible liquid. It is incompatible with oxidizing agents, strong acids, and alkalis.

Thermal-oxidative degradation products can include carbon monoxide.

SECTION 6. HEALTH HAZARD INFORMATION | TLV

Methyl n-amy ketone is not listed as a carcinogen by the NTP, IARC, or OSHA.

Inhalation of methyl n-amy ketone can irritate the eyes, nose, and throat. Exposure to high concentrations will produce headache, dizziness, and, in extreme cases, unconsciousness, because this material is a central nervous system depressant. Unacclimated individuals may suffer more pronounced effects. Prolonged or repeated contact with the skin can produce irritation and dermatitis.

FIRST AID:

EYE CONTACT: Flush thoroughly with running water (including under eyelids) for 15 minutes.

SKIN CONTACT: Remove contaminated clothing. Wash affected area with soap and water.

INHALATION: Remove victim to fresh air.

INGESTION: Get medical help! * If victim is conscious, and physician is not immediately available, give him milk or water to drink to induce vomiting.

* GET MEDICAL ASSISTANCE = In plant, paramedic, community. Get medical help for further treatment, observation, and support after first aid, if indicated.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel of spills. Provide optimum explosion-proof ventilation. Remove sources of ignition. Provide cleanup personnel with protection against contact with liquid and inhalation of vapors. Absorb small spills on paper and evaporate in exhaust hood.

Contain large spills and absorb on vermiculite. Pick up with nonsparking scoop and place in a closed metal container for disposal.

Spills can be flushed with water to remove them from hazardous area; flush them to open area or to ground for evaporation. Prevent discharge into sewers, drains, and waterways.

DISPOSAL: Burn waste material in an approved incinerator or have it disposed of by a licensed disposal company. Follow Federal, state, and local regulations.

SECTION 8. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation to meet TLV requirements. Exhaust hoods should have a minimum face velocity of 100 linear feet per minute. Exhaust fans and other electrical services must be of explosion-proof construction. For emergency and nonroutine work above the TLV, an approved, full-facepiece, organic-vapor canister gas mask is recommended; but for unknown concentrations or those above about 4000 ppm, self-contained or air-supplied respirators (positive pressure) are needed.

Wear protective clothing, including rubber gloves, apron, etc., to avoid skin contact, and safety goggles or full face shield to protect the eyes from splashes.

Eyewash fountains and safety showers should be available in areas of use and handling.

Use of contact lenses should be prohibited because they pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Store in tightly closed drums in a clean, cool, well-ventilated area away from heat, ignition, strong acids, alkalies, and oxidizing agents. Containers should be electrically interconnected and grounded for liquid transfers to prevent static sparks. Storage and use areas should be No Smoking areas. Use nonsparking tools. Small amounts should be handled in approved safety cans with proper labeling. Electrical services must meet code requirements.

Avoid skin and eye contact. Avoid breathing vapors. Do not ingest. Wash thoroughly after handling.

DOT Classification: Combustible Liquid

ID No.: UN1110

Label: None

Data Source(s) Code: 1, 2-7, 12, 13, 14, 19, 23, 26, 27, 34, 38, 47, 82, 84. CK

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Approvals *JO. Accroce, 11/86.*

Indust. Hygiene/Safety *JW 10-86*

Medical Review *[Signature]*

MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION
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NO. 530

PETROLEUM "ETHER",
HIGH BOILING

DATE May 1984

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: PETROLEUM "ETHER", HIGH BOILING
DESCRIPTION: Distillation mixture of aliphatic hydrocarbons mainly in C₇ to C₈ range.
OTHER DESIGNATIONS: Ligroin(e); Aliphatic Naphtha, CAS #008 030 317, CAS #008 030 306;
CAS #008 032 324 (C₅-C₇ Aliphatic hydrocarbons); CAS #064 748 898 Light Aliphatic
Solvent Naphtha (see also MSDS #518)
MANUFACTURER: Available from several suppliers, including:
Fisher Scientific Co. - Chemical Manufacturing Div.
P.O. Box 375, Reagent Lane
Fair Lawn, NJ 07410 Tel: (201) 796-7100

SECTION II. INGREDIENTS AND HAZARDS

Typical Composition:

Petroleum distillate (Aliphatic Naphtha C₇-C₈)*
n-Hexane (Minor fraction or nil; see MSDS #397)
Heptanes 3 (Major fraction)
Octanes
Other Hydrocarbons (Minor fraction or nil)

*Petroleum fraction related to MSDS #518 but of higher boiling range, higher density, higher flash point.

**Current OSHA PEL; NIOSH (1977) recommended a 10-hr TWA for all petroleum distillates of 350 mg/m³ (85 ppm for heptane; 75 ppm for octane).

%	HAZARD DATA	
~100	8-hr TWA, ppm	OSHA PEL**
	ACGIH (1983)	TLV
	500	500
	500	50
	500	400
	500	300
	-	-

SECTION III. PHYSICAL DATA

Boiling point, 1 atm, deg C ----- 80-130* Specific gravity, (H₂O=1) ----- 0.68-0.72*
Vapor pressure, 20C, mm Hg ----- ~40* Volatiles, % ----- ~100
Vapor density (Air=1) ----- ~3.4
Solubility in water ----- Insoluble

Appearance & Odor: Clear, colorless liquid. Slight, characteristic odor.

*Exact values depend on the particular petroleum "ether" cut used. Cuts narrower and lower boiling than this range are also used (see also MSDS #518).

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits in Air	Lower	Upper
			~1	~6
>15F (CC)	~450F	% by Volume		

Extinguishing media: Dry chemical, carbon dioxide, foam. Use water spray to cool fire-exposed containers and surroundings. Use smothering technique to put out fires. Water may be ineffective. Forced water stream could scatter fire. Highly flammable when exposed to heat or flame. Readily volatilizes to form explosive vapor-air mixtures. Vapors can flow along surfaces to distant ignition sources and flashback. Firefighters should wear self-contained breathing apparatus.

SECTION V. REACTIVITY DATA

This is a stable material in closed containers at room temperature under normal storage and handling conditions. It does not polymerize. Heating greatly increases the flammability hazard of this OSHA Class IB Flammable Liquid. It is incompatible with strong oxidizing agents. Thermal-oxidative degradation can yield partial oxidation products, hydrocarbons, carbon monoxide and carbon dioxide.

SECTION VI. HEALTH HAZARD INFORMATION	TLV ~300 ppm (See Sect II)
<p>Excessive inhalation of fumes, vapor or mist irritates respiratory passages and can cause headache, dizziness, nausea, inebriation, peripheral nerve disorder (n-hexane metabolites in particular), CNS depression depending on conc. and time of exposure. Contact with high vapor levels or liquid causes transitory irritation of eyes.</p> <p>Liquid contact with skin is defatting and irritating; prolonged or repeated contact can cause dermatitis. Ingestion causes irritation to mouth, throat, G.I. tract with coughing, vomiting, blurred vision, dilated pupils and diarrhea as symptoms. Aspiration into lungs may cause hemorrhaging, pulmonary edema and chemical pneumonitis.</p> <p>FIRST AID:</p> <p><u>Eye Contact:</u> Flush thoroughly with running water for 15 min., including under eyelids.</p> <p><u>Skin Contact:</u> Remove contaminated clothing. Wash affected area with soap and water.</p> <p><u>Get medical help</u> if large areas of body are exposed or if irritation persists.</p> <p><u>Inhalation:</u> Remove to fresh air. Restore and/or support breathing. Have trained person administer oxygen if breathing is difficult. Call a physician.</p> <p><u>Ingestion:</u> Contact physician! Aspiration hazard! Do not induce vomiting. Give 2-4 oz. olive oil or USP white mineral oil to drink. If spontaneous vomiting occurs, hold victim's head lower than hips to help avoid aspiration.</p>	
<p>SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES</p> <p>Evacuate area for large spills. Provide explosion-proof ventilation; remove ignition sources. Those involved in clean up should use protection against liquid contact and vapor inhalation. Contain spill. Do not send to sewer or allow to enter streams or surface water. Pick up liquid for reclaim or disposal. Add absorbent solid (sand or vermiculite) to small spills and residues and pick up and place in appropriate closed container for disposal using non-sparking tools. Trace residues and vapors can be dispersed with evaporation and ventilation.</p> <p>DISPOSAL: Scrap solvent may be disposed of through a licensed waste disposal company, or by controlled incineration; absorbed material can be buried in an approved landfill. Report spills that enter (or threaten to enter) navigable waters. Follow Federal, State, and Local regulations.</p>	
<p>SECTION VIII. SPECIAL PROTECTION INFORMATION</p> <p>Use general ventilation and local exhaust ventilation (explosion-proof) to keep vapors and mists at a low level. Where respiratory protection is needed, an approved organic vapor cartridge respirator with full facepiece can be used below 1000 ppm. A chin type organic vapor canister gas mask is required above 1000 ppm. Use an air-supplied or self-contained respirator with full facepiece above 5000 ppm.</p> <p>Use rubber gloves to prevent repeated or prolonged contact with liquid and safety glasses for eye protection where splashing is possible. Conditions of use may require additional protection against body contact with liquid.</p> <p>Provide an eyewash station, washing facilities and safety shower.</p> <p>Promptly remove and isolate solvent-contaminated clothing (fire and health hazard); launder before reuse.</p>	
<p>SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS</p> <p>Store in closed containers in a well-ventilated area. Keep away from strong oxidizing agents and sources of heat or ignition. No smoking in areas of storage or use. Electrically bond and ground containers for transfers to prevent static electric sparks. Near this material use explosion-proof electrical equipment and non-sparking tools. Handle and store as an OSHA Class IB flammable liquid.</p> <p>Wear clean work clothing. Use with good ventilation. Follow good hygiene practice. Avoid prolonged or repeated skin contact and breathing of vapors or mists. DO NOT INGEST!</p> <p>DOT Classification: FLAMMABLE LIQUID I.D. No. UN1255 Petroleum Naphtha Label: FLAMMABLE LIQUID NA1268 Naphtha Distillate UN1266 Petroleum Distillate</p> <p>DATA SOURCE(S) CODE: 1,2,4-7,9,12,14,31,34,38</p>	
<p>Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, Genium Publishing Corporation extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.</p>	<p>APPROVALS: MIS/CRD <i>J. M. Nelson</i></p> <p>INDUST. HYGIENE/SAFETY <i>JW 5/29/84</i></p> <p>MEDICAL REVIEW: 15 June 1984</p>

Material Safety Data Sheet

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GENIUM PUBLISHING CORP.

No. 683

POLYCHLORINATED BIPHENYLS
(PCBs)

Issued: November 1988

SECTION 1. MATERIAL IDENTIFICATION

27

Material Name: POLYCHLORINATED BIPHENYLS (PCBs)

Description (Origin/Uses): Commercial PCBs are mixtures that were once widely manufactured by combining chlorine gas, iron filings, and biphenyls. Their high stability contributes to their intended commercial applications and their accidental, long-term adverse environmental and health effects. PCBs are useful as insulators in electrical equipment because they are electrically nonconductive. Their distribution has been limited since 1976. The Aroclor PCB codes identify PCBs by type. The first two digits of a code indicate whether the PCB contains chlorinated biphenyls (12), chlorinated terphenyls, (54), or both (25, 44); the last two digits indicate the approximate percentage of chlorine. Found in insulating liquid, synthetic rubber, plasticizers, flame retardants, floor tile, printer's ink, paper and fabric coatings, brake linings, paints, automobile body sealants, asphalt, adhesives, electrical capacitors, electrical transformers, vacuum pumps, gas-transmission turbines, heat-transfer fluids, hydraulic fluids, lubricating and cutting oil, copying paper, carbonless copying paper, and fluorescent light ballasts.

Synonym: Chlorodiphenyls

Other Designations (Producer, Trade Name, Nation): Monsanto, Aroclor® (USA, Great Britain); Bayer, Clophen® (German Democratic Republic); Prodelec, Phenoclor®, Pyralene® (France); Kanegafuchi, Kanechlor®; Mitsubishi, Santotherm® (Japan); Caffaro, Fenclor® (Italy).

Trade Name	CAS No.	RTECS No.	Trade Name	CAS No.	RTECS No.	HMIS
Aroclors	01336-36-3	TQ1350000	Aroclor 1242	53469-21-9	TQ1356000	H 1 R 1
Aroclor 1016	12674-11-2	TQ1351000	Aroclor 1248	12672-29-6	TQ1358000	F 1 I 3
Aroclor 1221	11104-28-2	TQ1352000	Aroclor 1254	11097-69-1	TQ1360000	R 0 S 1
Aroclor 1232	11141-16-5	TQ1354000	Aroclor 1260	11096-82-5	TQ1362000	PPG* K 1



Genium

SECTION 2. INGREDIENTS AND HAZARDS/EXPOSURE LIMITS

PCB-42% Chlorine/Aroclor 1242	PCB-54% Chlorine/Aroclor 1254	All PCBs/Aroclors
CAS No. 53469-21-9	CAS No. 11097-69-1	CAS No. 1336-36-3
OSHA PEL (Skin*)	OSHA PEL (Skin*)	NIOSH REL 1977
8-Hr TWA: 1 mg/m ³	8-Hr TWA: 0.5 mg/m ³	10-Hour TWA: 0.001mg/m ³
ACGIH TLV (Skin*), 1988-89	ACGIH TLV (Skin*), 1988-89	Toxicity Data**
TLV-TWA: 1 mg/m ³	TLV-TWA: 0.5 mg/m ³	Mouse, Oral, LD ₅₀ : 1900 mg/kg

*This material can be absorbed through intact skin, which contributes to overall exposure.

**See NIOSH, RTECS (Genium ref. 90), at the locations specified in section 1 for additional data with references to tumorigenic, reproductive, mutagenic, and irritative effects.

SECTION 3. PHYSICAL DATA

Boiling Point: Ranges from 527°F (275°C) to 725°F (385°C)	% Volatile by Volume: Ranges from 1.2 to 1.6
Solubility in Water (%): Insoluble	Molecular Weight (Average): Aroclor 1242: 258 Grams/Mole
Pour Point: Ranges from -31°F (-35°C) to 87.8°F (31°C)	Aroclor 1254: 326 Grams/Mole
Appearance and Odor: Clear to light yellow mobile oil to a sticky resin; a sweet "aromatic" odor. As the percentage of chlorine increases, the PCB becomes thicker and heavier; e.g., Aroclor 1254 is more viscous than Aroclor 1242.	

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point*	Autoignition Temperature: Not Found	LEL: Not Found	UEL: Not Found
Extinguishing Media: Use water spray/fog, carbon dioxide (CO ₂), dry chemical, or "alcohol" foam to extinguish fires that involve polychlorinated biphenyls. Although it is very difficult to ignite PCBs, they are often mixed with more flammable materials (oils, solvents, etc.)			
Unusual Fire or Explosion Hazards: If a transformer containing PCBs is involved in a fire, its owner may be required to report the incident to appropriate authorities. Consult and follow all pertinent Federal, state, and local regulations. Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode; fire fighters must also wear a complete set of protective clothing. Comments: The hazards of PCB fires are associated with the possibility of their being released into the environment where they and their products of degeneration can pose serious long-term health risks. These potential problems are heightened by the PCBs' resistance to biological and chemical degradation and by the possibility that they will contaminate underground water systems (see sect. 5)			

*Ranges from 284°F (140°C) to 392°F (200°C).

SECTION 5. REACTIVITY DATA

Stability/Polymerization: Polychlorinated biphenyls are very stable materials. Hazardous polymerization cannot occur.

Chemical Incompatibilities: PCBs can react dangerously with sodium or potassium. These reactions are part of an industrial process used to destroy PCBs; however, people have been killed by explosions at PCB treatment, storage, and disposal sites. Conditions to Avoid: Limit human exposure to PCBs to the lowest possible level; especially avoid contact with skin. Hazardous Products of Decomposition: Thermal-oxidative degradation of PCBs can produce toxic gases such as carbon monoxide, chlorine, chlorinated aromatic fragments, phenolics, aldehydes, and hydrogen chloride. Incomplete combustion of PCBs produces toxic compounds such as polychlorinated dibenzofuran (PCDF, the major product of combustion), and polychlorinated dibenzo-*p*-dioxin (PCDD or dioxin).

SECTION 6. HEALTH HAZARD INFORMATION

Carcinogenicity: The EPA lists PCBs as carcinogens, and the IARC classifies them as probable human carcinogens (group 2B).
Summary of Risks: Effects of accidental exposure to PCBs include acneform eruptions; eye discharge; swelling of the upper eyelids and hyperemia of the conjunctiva; hyperpigmentation of skin, nails, and mucous membrane; chloroacne; distinctive hair follicles; fever; hearing difficulties; limb spasms; headache; vomiting; and diarrhea. PCBs are potent liver toxins that can be absorbed through unbroken skin in hazardous amounts without immediately discernible pain or discomfort. Severe health effects can develop later. In experimental animals, prolonged or repeated exposure to PCBs by any route results in liver damage at levels that are less than those reported to have caused cancer in rodents. **Medical Conditions Aggravated by Long-Term Exposure:** None reported. **Target Organs:** Skin, eyes, eyelids, blood, liver.
Primary Entry: Inhalation, skin contact/absorption. **Acute Effects:** Skin and eye irritation, acneform dermatitis, nausea, vomiting, abdominal pain, jaundice, liver damage. **Chronic Effects:** Possible cancer (evidence of this is inconclusive); reproductive effects (jaundice, excessive secretion of tears, dermal chromopexy); and hepatitis. **FIRST AID:** Eyes. Immediately flush eyes, including under the eyelids, gently but thoroughly with flooding amounts of running water for 15 minutes. Skin. Rinse exposed skin with flooding amounts of water; wash with soap and water. Inhalation. Remove the exposed person to fresh air; restore and/or support breathing as needed. Have qualified medical personnel administer oxygen as required. Ingestion. Induce vomiting by sticking your finger to the back of the exposed person's throat. Have him or her drink 1 to 2 glasses of milk or water. Get medical help (in plant, paramedic, community) for all exposures. Seek prompt medical assistance for further treatment, observation, and support after first aid. **Note to Physician:** PCBs are poorly metabolized, soluble in lipids, and they accumulate in tissues or organs rich in lipids. Liver function tests can help to determine the extent of body damage in exposed persons. If electrical equipment containing PCBs arcs over, the PCBs or other hydrocarbon dielectric fluids may decompose and give off hydrochloric acid (HCl), a potent respiratory irritant.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: Treat any accidental release of PCBs as an emergency. An SPCCP (spill-prevention control and countermeasure plan) must be formulated before spills or leaks occur. PCBs are resistant to biodegradation, soluble in lipids, and chemically stable; as such they have become significant contaminants of global ecosystems. Releases of PCBs require immediate, competent, professional response from trained personnel. Each release situation is unique and requires a specifically designed cleanup response. General recommendations include adhering to Federal regulations (40 CFR Part 761). Notify safety personnel, evacuate nonessential personnel, ventilate the spill area, and contain the PCBs. All wastes, residues, and contaminated cleanup equipment from the incident are subject to EPA requirements (40 CFR 761). Consult your attorney or appropriate regulatory officials for information about reporting requirements and disposal procedures. **Waste Disposal:** Contact your hazardous waste disposal firm or a licensed contractor for detailed recommendations, especially when PCBs are unexpectedly discovered. Follow Federal, state, and local regulations. PCBs are biomagnified in the food chain; i.e., their concentration increases at each link. The disposal of PCBs or of PCB-contaminated materials is strictly regulated; violations of applicable laws can result in fines, lawsuits, and negative publicity. **Warning:** Accidental spills of PCBs that may affect water supplies must be reported to Coast Guard personnel at the National Response Center, telephone (202) 426-2675.

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000 Subpart Z).

EPA Designations (40 CFR 302.4)

CERCLA Hazardous Substance, Reportable Quantity: 10 lbs (4.54 kg), per the Clean Water Act (CWA), §§ 311 (b) (4) and 307 (a).

SECTION 8. SPECIAL PROTECTION INFORMATION

Goggles: Always wear protective eyeglasses or chemical safety goggles. Where splashing of PCBs is possible, wear a full face shield. Follow OSHA eye- and face-protection regulations (29 CFR 1910.133). **Respirator:** Wear a NIOSH-approved respirator per Genium reference 88 for the maximum-use concentrations and/or exposure limits cited in section 2. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (leaks or cleaning reactor vessels and storage tanks), wear an SCBA. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves, boots, aprons, and gauntlets, etc., to prevent any contact of PCBs with your skin. **Ventilation:** Install and operate general and local maximum, explosion-proof ventilation systems powerful enough to maintain airborne levels of this material below the OSHA PEL standards cited in section 2. Local exhaust ventilation is preferred because it prevents dispersion of the contamination into the general work area by eliminating it at its source. Consult the latest edition of Genium reference 103 for detailed recommendations. **Safety Stations:** Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work areas. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them. Do not wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean this material from your shoes and equipment. Heavily soiled clothing must be properly discarded in a manner consistent with applicable regulations. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material and before eating, drinking, smoking, using the toilet, or applying cosmetics. Keep it off your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in work areas.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage Segregation: Store PCBs in closed containers in a cool, dry, well-ventilated area. Protect containers from physical damage. **Special Handling/Storage:** All storage facilities must have adequate containment systems (dikes; elevated, nonporous holding platforms; retaining walls) to prevent any major release of PCBs into the environment. Carefully design and implement these extra precautions now; do not wait until you have to respond to an accidental release of this material.

Transportation Data (49 CFR 172.101-2; PCBs were the first materials to be directly regulated by Congress by way of TSCA in 1976.)

DOT Shipping Name: Polychlorinated Biphenyls

IMO Shipping Name: Polychlorinated Biphenyls

DOT Hazard Class: ORM-E

IMO Hazard Class: 9

ID No. UN 23115

IMDG Packaging Group: II

DOT Packaging Requirements: 49 CFR 173.510

References: 1, 6, 26, 38, 84-94, 100, 101, 116, 117, 120, 122.

Prepared by PJ Igoe, BS; Industrial Hygiene Review: DJ Wilson, CIH; Medical Review: W Silverman, MD

Technical Review: Northeast Analytical, Inc. (PCB and VOC Specialists), Schenectady, New York, Telephone: (518) 346-4592

Material Safety Data Sheet

From Genium's Reference Collection
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No. 81

SILVER NITRATE
(Revision A)
Issued: December 1980
Revised: August 1988

SECTION 1. MATERIAL IDENTIFICATION

26

Material Name: SILVER NITRATE

Description (Origin/Uses): Used in photography, silver plating, inks, paints, hair dyes, and pharmaceuticals; in etching ivory, coloring porcelain, and the manufacturing of mirrors; also as a universally applied reagent in analytical chemistry.

Other Designations: Lunar Caustic; AgNO_3 ; CAS No. 7761-88-8

Manufacturer: Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.



HMIS

H 2

F 0

R 2

PPG*

*See sect. 8

NFPA
Nonfire

R 1

I 4

S 3

K 0

SECTION 2. INGREDIENTS AND HAZARDS

%

EXPOSURE LIMITS

Silver Nitrate, CAS No. 7761-88-8

Ca 100

OSHA PEL
8-Hr TWA: 0.01 mg/m³ (as Silver)

ACGIH TLVs, 1987-88
TLV-TWA: 0.1 mg/m³ (Metal Dust and Fume)
TLV-TWA: 0.01 mg/m³ (Soluble Compounds, as Ag)

*See NIOSH, RTECS (VW4725000), for additional data with references to reproductive, irritative, and mutagenic effects.

Toxicity Data*
Man, Unknown, LD₅₀: 29 mg/kg
Mouse, Oral, LD₅₀: 50 mg/kg

SECTION 3. PHYSICAL DATA

Boiling Point: Decomposes at 824°F (440°C) into metallic silver, nitrogen, oxygen, and nitrogen oxides.
Melting Point: 414°F (212°C)
Specific Gravity ($\text{H}_2\text{O} = 1$): 4.35

Water Solubility (%): Complete
Molecular Weight: 170 Grams/Mole
Vapor Pressure: Negligible

Appearance and Odor: Colorless, transparent large crystals or white small crystals; odorless.

SECTION 4. FIRE AND EXPLOSION DATA

LOWER

UPPER

Flash Point and Method

Autoignition Temperature

Flammability Limits in Air

*

*

% by Volume

*

*

Extinguishing Media: *Silver nitrate does not burn. Use water only on small fires; do not use dry chemical or CO_2 . For large fires, flood the area with water. For extensive fires in cargo areas, make every effort to extinguish flames from remote, safe locations using unmanned hose holders or monitor nozzles. If this is impossible, evacuate the area and let the fire burn. Contain the runoff from fire control; uncontrolled runoff to sewers may create fire or explosion hazards. Remove containers of silver nitrate from the area if it is safe to do so; cool fire-exposed containers with water at a safe distance until well after the fire is extinguished.

Unusual Fire or Explosion Hazards: Silver nitrate *alone* does not present any unusual fire or explosion hazard when exposed to heat or flame; however, it is a strong oxidizer that greatly increases the flammability of any combustible material it touches.

Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

SECTION 5. REACTIVITY DATA

Silver nitrate is stable in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization.

Chemical Incompatibilities: Under suitable conditions, silver nitrate reacts dangerously (explosion; ignition, propellant type of burning; formation of explosive products) with acetylene, ammonium hydroxide, aziridine, calcium carbide, ethanol, ethanol and nitric acid, ethyleneimine, 1-bromo-2-propyne, charcoal, chlorine trifluoride, ethylene oxide, ethylene hydroperoxide, hydrogen peroxide, magnesium oxalic acid, tartaric acid, peroxymonosulfuric acid, phosphine, phosphonium iodide, phosphorus, phosphorus isocyanate, sulfur, plastics, arsenic, or cuprous acetylide. See Genium reference 84 (p. 491M-185).

Conditions to Avoid: Do not expose silver nitrate to incompatible chemicals.

Hazardous Products of Decomposition: Toxic fumes such as silver oxides and toxic gases such as nitrogen oxides can be produced during certain fire conditions.

SECTION 6. HEALTH HAZARD INFORMATION

Silver nitrate is not listed as a carcinogen by the NTP, IARC, NIOSH, ACGIH, or OSHA.

Summary of Risks: Silver nitrate, along with its dust and solution, is very irritating and corrosive to the skin; eyes; mucous membranes; and, if ingested, to the gastrointestinal tract. It may be absorbed into the body following ingestion or inhalation. Ingestion can cause severe gastroenteritis and gastric bleeding, and chronic, possibly fatal, gastroenteritis or shock. Inhalation or ingestion can lead to generalized argyria, a slate gray pigmentation or color change that may be uniformly distributed over the face, forehead, neck, hands, and forearms; the fingernails may be a chocolate brown color. Skin contact, especially if the skin is wet, can cause skin burns or localized pigmentation problems. Initial pigmentation occurs in the eyes, nasal septum, and throat before generalized argyria occurs. Seizures have been reported following ingestion.

Medical Conditions Aggravated by Long-Term Exposure: None reported. **Target Organs:** Eyes, skin, nasal septum, throat, fingernails. **Primary Entry:** Inhalation, skin contact. **Acute Effects:** Inhalation may cause shortness of breath, coughing, and sore throat. **Chronic Effects:** Generalized argyria and methemoglobinemia may result from long-term exposure to silver nitrate.

FIRST AID

Eyes: Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. Permanent eye injuries can result from eye contact with silver nitrate dust or solution; any eye exposure must be treated as an emergency. **Skin:** Immediately wash the affected area with soap and water. Treat skin burns. **Inhalation:** Remove the exposed person to fresh air. **Ingestion:** Never give anything by mouth to someone who is unconscious or convulsing. Give the exposed person 4 to 8 ounces of milk or water to drink. Do not induce vomiting.

GET MEDICAL HELP (IN PLANT, PARAMEDIC, COMMUNITY) FOR ALL EXPOSURES. Seek prompt medical assistance for further treatment, observation, and support after first aid. Specific medical protocols have been developed to treat methemoglobinemia.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: If dust is generated, wear appropriate respiratory protection (see sect. 8). Ventilate the affected area; carefully scoop or vacuum waste, using an appropriate filter, into a suitable container for reclamation or disposal. Remove sources of heat or ignition. Do not get water inside containers of silver nitrate. Genium ref. 85 (guide 45) recommends the following: for small, dry spills, use a clean shovel to put the material into a clean, dry container. Cover containers and move them out of the spill area. For small spills, flush the area with flooding amounts of water. For large spills, dike the area far beyond the spill for later disposal.

Waste Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow Federal, state, and local regulations.

OSHA Designations

Air Contaminant (29 CFR 1910.1000 Subpart Z)

EPA Designations (40 CFR 302.4)

CERCLA Hazardous Substance, Reportable Quantity: 1 lb (0.454 kg), per the Clean Water Act (CWA), Section 311 (b) (4)

SECTION 8. SPECIAL PROTECTION INFORMATION

Goggles: Always wear protective eyeglasses or chemical safety goggles. Where splashing of silver nitrate solution may occur, wear a full face shield or splash guard. Follow OSHA eye- and face-protection regulations (29 CFR 1910.133). **Respirator:** Use a NIOSH-approved respirator per Genium reference 88 for the maximum-use concentrations and/or the exposure limits cited in section 2. Follow OSHA respirator regulations (29 CFR 1910.134). **Other:** Wear impervious gloves, boots, aprons, and gauntlets, etc., as required by the specific work environment to prevent excessive skin contact or contamination.

Ventilation: Install and operate general and local exhaust-ventilation systems powerful enough to maintain airborne levels of silver nitrate dust below the OSHA PEL standard cited in section 2. **Safety Stations:** Make eyewash stations, washing facilities, and safety showers available in use and handling areas. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. Particles can adhere to contact lenses and cause corneal damage. Do *not* wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean this material from shoes and equipment.

Comments: Practice good personal hygiene; always wash thoroughly after using this material. Keep it off of your clothes and equipment. Avoid transferring silver nitrate dust from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in any work area.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage/Segregation: Store silver nitrate in a cool, dry, well-ventilated, low-fire-risk area away from incompatible chemicals (see sect. 5).

Special Handling/Storage: Protect containers from physical damage, use this material with adequate ventilation, and do not create dusty conditions.

Transportation Data (49 CFR 172.101-2)

DOT Shipping Name: Silver Nitrate

DOT ID No. UN1493

DOT Label: Oxidizer

DOT Hazard Class: Oxidizer

IMO Label: Oxidizer

IMO Class: 5.1

References: 1, 2, 4, 5, 9, 12, 27, 43, 55, 58, 73, 82-94, 103, 112, 113, 114.

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Prepared by PJ Igoe, BS

Industrial Hygiene Review: DJ Wilson, CIH

Medical Review: MJ Hardies, MD

SJJ500 SODIUM PLATINIC CHLORIDE

SYNS: CL 227193 ◊ PIPERACILLIN SODIUM ◊ PIPRACIL ◊ PIPRIL
◊ T 1220

TOXICITY DATA with REFERENCE

ivn-mus TDLo:10 g/kg (6-15D preg):TER NKRZAZ

25,915,77

ivn-wmn TDLo:2180 mg/kg/6D-I:BLD SMJOAV

79,255,86

ims-wmn TDLo:960 mg/kg/3D-I:BLD SMJOAV 78,363,85

ipr-rat LD50:7600 mg/kg NKRZAZ 25,816,77

scu-rat LD50:8800 mg/kg IYKEDH 10,884,79

ivn-rat LD50:2260 mg/kg IYKEDH 10,884,79

ipr-mus LD50:9770 mg/kg NKRZAZ 25,816,77

ivn-mus LD50:4900 mg/kg NKRZAZ 25,816,77

SAFETY PROFILE: Moderately toxic by intravenous route. An experimental teratogen. Human systemic effects: normocytic anemia, leukopenia, hemorrhage. When heated to decomposition it emits toxic fumes of SO_x, NO_x and Na₂O.

SJJ500

CAS:1307-82-0

HR: 3

SODIUM PLATINIC CHLORIDE

mf: Cl₆Pt•2Na•4H₂O mw: 571.83

SYNS: PLATINIC SODIUM CHLORIDE ◊ SODIUM CHLOROPLATINATE

TOXICITY DATA with REFERENCE

ihl-hmn TCLO:0.9 µg/m³:PUL BJIMAG 2,92,45

scu-rbt LDLo:180 mg/kg BSIBAC 8,1152,33

OSHA PEL: TWA 0.002 mg(Pt)/m³

ACGIH TLV: TWA 0.002 mg(Pt)/m³

SAFETY PROFILE: Poison by subcutaneous route. Human systemic effects by inhalation of very small amounts: pulmonary changes. When heated to decomposition it emits toxic fumes of Cl⁻ and Na₂O. See also PLATINUM COMPOUNDS.

SJK000

CAS:9003-04-7

HR: 1

SODIUM POLYACRYLATE

TOXICITY DATA with REFERENCE

eye-rbt 2 mg MOD PSTGAW 20,16,33

CONSENSUS REPORTS: Reported in EPA TSCA Inventory.

SAFETY PROFILE: An eye irritant. When heated to decomposition it emits toxic fumes of Na₂O.

SJK200

HR: 3

SODIUM POLYOXYETHYLENE ALKYL ETHER SULFATE

TOXICITY DATA with REFERENCE

orl-rat LD50:3870 mg/kg TOIZAG 25,876,78

scu-rat LD50:5050 mg/kg TOIZAG 25,876,78

ivn-rat LD50:146 mg/kg TOIZAG 25,876,78

orl-mus LD50:5100 mg/kg TOIZAG 25,876,78

scu-mus LD50:4340 mg/kg TOIZAG 25,876,78

ivn-mus LD50:223 mg/kg TOIZAG 25,876,78

SAFETY PROFILE: Poison by intravenous route. Moderately toxic by ingestion. When heated to decomposition it emits toxic fumes of SO_x and Na₂O. See also ETHERS and SULFATES.

SJK375

CAS:25704-18-1

SODIUM POLYSTYRENE SULFONATE

mf: (C₈H₈O₃S•Na)_n

SYNS: 4-ETHENYL-BENZENESULFONIC ACID SODIUM HOMOPOLYMER (9CI) ◊ KAYEXALATE ◊ POLY(SODIUM STYRENESULFONATE)

TOXICITY DATA with REFERENCE

orl-rat TDLo:28 g/kg (8-14D preg):REP

orl-rat LD50:16 g/kg OYYAA2 4,79,70

orl-mus LD50:10 g/kg OYYAA2 4,79,70

CONSENSUS REPORTS: Reported in EPA Inventory.

SAFETY PROFILE: Mildly toxic by ingestion. Experimental reproductive effects. When heated to decomposition it emits toxic fumes of SO_x and Na₂O. See also SULFONATES.

SJK400

CAS:1099-87-2

HR

SODIUM PRASTERONE SULFATE

mf: C₁₉H₂₆O₃S•Na mw: 389.50

SYN: (3-β)-3-(SULFOXY)-ANDROST-5-EN-17-ONE SODIUM SALT (9CI)

TOXICITY DATA with REFERENCE

ipr-rat LD50:523 mg/kg NIIRDN 6,687,82

scu-rat LD50:1005 mg/kg NIIRDN 6,687,82

ivn-rat LD50:468 mg/kg NIIRDN 6,687,82

ipr-mus LD50:460 mg/kg NIIRDN 6,687,82

scu-mus LD50:899 mg/kg NIIRDN 6,687,82

ivn-mus LD50:274 mg/kg NIIRDN 6,687,82

SAFETY PROFILE: Poison by intravenous route. Moderately toxic by intraperitoneal and subcutaneous routes. A steroid. When heated to decomposition it emits toxic fumes of SO_x and Na₂O.

SJK410

CAS:1099-87-2

HR: 1

SODIUM PRASTERONE SULFATE DIHYDRATE

mf: C₁₉H₂₆O₃S•Na mw: 426.55

SYN: 3-β-HYDROXY-5-ANDROSTEN-17-ONE SODIUM SULFATE DIHYDRATE

TOXICITY DATA with REFERENCE

ipr-rat LD50:559 mg/kg IYKEDH 12,668,81

scu-rat LD50:1005 mg/kg IYKEDH 12,668,81

MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION

1145 CATALYN ST., SCHENECTADY, NY 12303 USA (518) 377-8854



MSDS # 3A
SODIUM HYDROXIDE
50% LIQUID

Revision A
Issued: October, 1977
Revised: August, 1985

From Genium's MSDS Collection, to be used as a reference.

SECTION 1. MATERIAL IDENTIFICATION

17

MATERIAL NAME: SODIUM HYDROXIDE, 50% LIQUID

OTHER DESIGNATIONS: Liquid caustic soda, lye solution, CAS #1310-73-2 (NaOH).

MANUFACTURER: Available from many sources including:

Diamond Shamrock Co., Chlor-Alkali Div.

351 Phelps Court, Box 152300

Irving, TX 75015-2300

(800) 241-3134



SECTION 2. INGREDIENTS AND HAZARDS

%

HAZARD DATA

SODIUM HYDROXIDE (NaOH)

>48.5

Ceiling Limit: 2 mg/m³*

TYPICAL IMPURITIES:

Carbonate (as Na₂CO₃)

<0.25

1% NaOH Soln

Chloride (as NaCl)

<1.15

Chlorate (as NaClO₃)

<0.25

Eye, rabbit: Severe irritation

Sulfate (as Na₂SO₄)

<0.03

Silica (as SiO₂)

<0.01

Water

balance

* Current (1985-86) ACGIH TLV. Current OSHA PEL is 2.0 mg/m³ averaged over 8 hours.

SECTION 3. PHYSICAL DATA

Boiling point, 1 atm ca 140°C

Specific gravity, 60/60°F ... 1.53

Volatiles (water) 50%

Density, lbs/gal 12.76

Water Solubility complete

Viscosity @ 20°C, cps ... 50

APPEARANCE & ODOR: Clear liquid - No odor.

DESCRIPTION: A 50% solution of sodium hydroxide (NaOH) in water.

SECTION 4. FIRE AND EXPLOSION DATA

Lower

Upper

Flash Point and Method

Autoignition Temp.

Flammability Limits in Air

None - not combustible

N/A

N/A

N/A

N/A

EXTINGUISHING MEDIA:

Use extinguishing agents suitable for the surrounding fire. Use water spray to cool containers of this material which are involved in a fire situation to help prevent rupture.

Sodium hydroxide will react with metals such as aluminum, tin, and zinc to generate flammable and explosive hydrogen gas.

Firefighters should wear self contained breathing apparatus and full protective gear to prevent contact with this corrosive material.

SECTION 5. REACTIVITY DATA

This material is stable under normal storage conditions in sealed containers. Polymerization will not occur. There are no hazardous decomposition products. It reacts with CO₂ in the air to form sodium carbonate. It reacts violently with acids accompanied by heat generation and with many organic chemicals, especially nitrocarbons and halocarbons. It can react with trichloroethylene to form spontaneously flammable dichloroacetylene.

Avoid contact with leather and wool. Contact with aluminum, tin, magnesium, zinc, and alloys that contain these metals causes the formation of hydrogen gas (MSDS #65) (flammable).

SECTION 6. HEALTH HAZARD INFORMATIONTLV Ceiling Unit: 2 mg/m³

Sodium Hydroxide is a strong alkali and is dangerous when improperly handled. It is destructive to all human tissue it contacts, producing severe burns. Eye contact causes severe, permanent injury. Skin contact causes irritation and, if not removed immediately, severe burns with scarring. The effects of inhalation of the mist varies from mild irritation to destructive burns. Pneumonitis may occur. Ingestion causes severe burns of the mouth, throat and stomach and may be fatal.

FIRST AID: Wash eyes immediately with plenty of running water for at least 15 minutes, including under eye-lids and all surfaces. Speed in rinsing eyes with water is important if permanent injury is to be avoided. Get medical help immediately. **SKIN CONTACT:** Flush exposed area promptly with large quantities of water. Remove contaminated clothes while washing. Prolong washing in serious cases until medical help arrives. Get medical attention for serious exposure. **INGESTION:** Immediately give person large quantities of water or milk to drink. (Never give anything by mouth to an unconscious person). Do not induce vomiting. Obtain medical assistance immediately. **INHALATION:** Remove from exposure to mist and get prompt medical help. (Paramedic, Inplant, community).

SECTION 7. SPILL, LEAK AND DISPOSAL PROCEDURES

Planning ahead is essential for handling spills. Clean-up personnel should wear protective equipment to prevent skin and eye contact. Pick-up spill with vacuum equipment (alkali resistant) for disposal or flush to holding area with water. Neutralize residue with dilute acid and rinse with water.

DISPOSAL: Waste caustic must never be discharged directly to sewers, drains or surface waters. Dilute well with water and carefully neutralize with acid. Follow all applicable federal, state and local regulations.

EPA HAZARDOUS WASTE NUMBER: D002, corrosive (soln c pH ≥ 12.5)-40CFR 261.22

REPORTABLE SPILL QUANTITY: 1000 lbs (40CFR117)

SECTION 8. SPECIAL PROTECTION INFORMATION

Provide adequate general ventilation and exhaust ventilation to meet TLV requirement, especially where the possibility of mist formation exists. Use a NIOSH-approved respirator with full face covering for mist, where needed. Use chemical safety goggles. A plastic faceshield, in addition to safety goggles, should be worn if splashing is probable. Use rubber gloves, apron or protective clothing and rubber boots where needed to prevent contact with sodium hydroxide solution.

Eyewash stations and safety showers must be immediately available.

THIS MATERIAL POSES A SPECIAL HAZARD TO CONTACT LENSES WEARERS; the slippery nature of this solution would make it extremely difficult to remove the contact lenses. Critical rinsing of the contaminated eye would be delayed.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Store in well-sealed containers. Protect containers from physical damage. Avoid handling conditions which can lead to spills or mist formation. Have abundant water (preferably running water) available where material is stored, unloaded, and handled for emergency use. Drains servicing areas where this material is stored or used should have retention basins for pH adjustment and dilution of spills and flushings before discharge. Workers handling this material should be trained in proper handling precautions and emergency procedures, with proper protective equipment nearby.

DOT HAZARD CLASSIFICATION: Corrosive Material

DOT LABEL: Corrosive

DOT ID NUMBER: UN1824

DATA SOURCE(S) CODE (See Glossary) 2, 4, 9, 11, 12, 27, 55, 58.V.

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APPROVALS.

JO Accrocco, 11/85

INDUST. HYGIENE/SAFETY

24/11/85

MEDICAL REVIEW:

SP Nov 85



No. 317
TOLUENE
(Revision D)

Issued: August 1979
Revised: April 1986

SECTION 1. MATERIAL IDENTIFICATION

20

MATERIAL NAME: Toluene

OTHER DESIGNATIONS: Methyl Benzene, Methyl Benzol, Phenylmethane, Toluol, C₇H₈, CAS #0108-88-3

MANUFACTURER/SUPPLIER: Available from many suppliers, including:
Allied Corp., PO Box 2064R, Morristown, NJ 07960; Telephone: (201) 455-4400
Ashland Chemical Co., Industrial Chemicals & Solvents Div., PO Box 2219,
Columbus, OH; Telephone: (614) 889-3844

HIMIS

H: 2

F: 3

R: 0

PPE*

*See sect. 8.



R 1
I 3
S 2
K 4

SECTION 2. INGREDIENTS AND HAZARDS

%

HAZARD DATA

Toluene



ca 100

8-hr TLV: 100 ppm, or
375 mg/m³ (Skin)**

Man, Inhalation, TClO:
100 ppm: Psychotropic***

Rat, Oral, LD₅₀: 5000 mg/kg

Rat, Inhalation, LCLo:

4000 ppm/4 hrs.

Rabbit, Skin, LD₅₀: 14 gm/kg

Human, Eye: 300 ppm

- * Current (1985-86) ACGIH TLV. The OSHA PEL is 200 ppm with an acceptable ceiling concentration of 300 ppm and an acceptable maximum peak of 500 ppm/10 minutes.
- ** Skin designation indicates that toluene can be absorbed through intact skin and contribute to overall exposure.
- *** Affects the mind.

SECTION 3. PHYSICAL DATA

Boiling Point ... 231°F (111°C)

Vapor Pressure @ 20°C, mm Hg ... 22

Water Solubility @ 20°C, wt. % ... 0.05

Vapor Density (Air = 1) ... 3.14

Evaporation Rate (BuAc = 1) ... 2.24

Specific Gravity (H₂O = 1) ... 0.866

Melting Point ... -139°F (-95°C)

Percent Volatile by Volume ... ca 100

Molecular Weight ... 92.15

Appearance and odor: Clear, colorless liquid with a characteristic aromatic odor. The odor is detectable to most individuals in the range of 10 to 15 ppm. Because olfactory fatigue occurs rapidly upon exposure to toluene, odor is not a good warning property.

SECTION 4. FIRE AND EXPLOSION DATA

LOWER UPPER

Flash Point and Method

Autoignition Temp.

Flammability Limits In Air

40°F (4°C) CC

896°F (480°C)

% by Volume

1.27

7.1

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical, alcohol foam. Do not use a solid stream of water because the stream will scatter and spread the fire. Use water spray to cool tanks/containers that are exposed to fire and to disperse vapors.

UNUSUAL FIRE/EXPLOSION HAZARDS: This OSHA class IB flammable liquid is a dangerous fire hazard. It is a moderate fire hazard when exposed to oxidizers, heat, sparks, or open flame. Vapors are heavier than air and may travel a considerable distance to an ignition source and flash back.

SPECIAL FIRE-FIGHTING PROCEDURES: Fire fighters should wear self-contained breathing apparatus with full facepiece operated in a positive-pressure mode when fighting fires involving toluene.

SECTION 5. REACTIVITY DATA

CHEMICAL INCOMPATIBILITIES: Toluene is stable in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization. This material is incompatible with strong oxidizing agents, dinitrogen tetroxide, silver perchlorate, tetranitromethane, and uranium hexafluoride. Contact with these materials may cause fire or explosion. Nitric acid and toluene, especially in the presence of sulfuric acid, will produce nitrated compounds that are dangerously explosive.

CONDITIONS TO AVOID: Avoid exposure to sparks, open flame, hot surfaces, and all sources of heat and ignition. Toluene will attack some forms of plastics, rubber, and coatings. Thermal decomposition or burning produces carbon dioxide and/or carbon monoxide.

SECTION 6. HEALTH HAZARD INFORMATION | TLV

Toluene is not considered a carcinogen by the NTP, IARC, or OSHA. **SUMMARY OF RISKS:** Vapors of toluene may cause irritation of the eyes, nose, upper respiratory tract, and skin. Exposure to 200 ppm for 8 hours causes mild fatigue, weakness, confusion, lacrimation (tearing) and paresthesia (a sensation of prickling, tingling, or creeping on the skin that has no objective cause). Exposure to higher concentrations may cause headache, nausea, dizziness, dilated pupils, and euphoria, and, in severe cases, may cause unconsciousness and death. The liquid is irritating to the eyes and skin. Contact with the eyes may cause transient corneal damage, conjunctival irritation, and burns if not promptly removed. Repeated and/or prolonged contact with the skin may cause drying and cracking. It may be absorbed through the skin in toxic amounts. Ingestion causes irritation of the gastrointestinal tract and may cause effects resembling those from inhalation of the vapor. Chronic overexposure to toluene may cause reversible kidney and liver injury. **FIRST AID: EYE CONTACT:** Immediately flush eyes, including under eyelids, with running water for at least 15 minutes. Get medical attention if irritation persists. **SKIN CONTACT:** Immediately flush skin (for at least 15 minutes) while removing contaminated shoes and clothing. Wash exposed area with soap and water. Get medical attention if irritation persists or if a large area has been exposed. **INHALATION:** Remove victim to fresh air. Restore and/or support breathing as required. Keep victim warm and quiet. Get medical help. **INGESTION:** Give victim 1 to 2 glasses of water or milk. Contact a poison control center. Do not induce vomiting unless directed to do so. Transport victim to a medical facility. Never give anything by mouth to a person who is unconscious or convulsing. **GET MEDICAL ASSISTANCE** - In plant, paramedic, community. Get medical help for further treatment, observation, and support after first aid, if indicated.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

SPILL/LEAK: Notify safety personnel of large spills or leaks. Remove all sources of heat and ignition. Provide maximum explosion-proof ventilation. Limit access to spill area to necessary personnel only. Remove leaking containers to safe place if feasible. Cleanup personnel need protection against contact with liquid and inhalation of vapor (see sect. 8). **WASTE DISPOSAL:** Absorb small spills with paper towel or vermiculite. Contain large spills and collect if feasible, or absorb with vermiculite or sand. Place waste solvent or absorbent into closed containers for disposal using nonsparking tools. Liquid can be flushed with water to an open holding area for handling. Do not flush to sewer, watershed, or waterway. **COMMENTS:** Place in suitable container for disposal by a licensed contractor or burn in an approved incinerator. Consider reclaiming by distillation. Contaminated absorbent can be buried in a sanitary landfill. Follow all Federal, state, and local regulations. TLm 96: 100-10 ppm. Toluene is designated as a hazardous waste by the EPA. The EPA (RCRA) HW No. is U220 (40 CFR 261). The reportable quantity (RQ) is 1000 lbs/454 kg (40 CFR 117).

SECTION 8. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation to meet TLV requirements. Ventilation fans and other electrical service must be nonsparking and have an explosion-proof design. Exhaust hoods should have a face velocity of at least 100 fpm (linear feet per minute) and be designed to capture heavy vapor. For emergency or nonroutine exposures where the TLV may be exceeded, use an organic chemical cartridge respirator if concentration is less than 200 ppm and an approved canister gas mask or self-contained breathing apparatus with full facepiece if concentration is greater than 200 ppm. Safety glasses or splash goggles should be worn in all work areas. Neoprene gloves, apron, face shield, boots, and other appropriate protective clothing and equipment should be available and worn as necessary to prevent skin and eye contact. Remove contaminated clothing immediately and do not wear it until it has been properly laundered.

Eyewash stations and safety showers should be readily available in use and handling areas.

Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

STORAGE SEGREGATION: Store in a cool, dry, well-ventilated area away from oxidizing agents, heat, sparks, or open flame. Storage areas must meet OSHA requirements for class IB flammable liquids. Use metal safety cans for handling small amounts. Protect containers from physical damage. Use only with adequate ventilation. Avoid contact with eyes, skin, or clothing. Do not inhale or ingest. Use caution when handling this compound because it can be absorbed through intact skin in toxic amounts. **SPECIAL HANDLING/STORAGE:** Ground and bond metal containers and equipment to prevent static sparks when making transfers. Do not smoke in use or storage areas. Use nonsparking tools. **ENGINEERING CONTROLS:** Preplacement and periodic medical exams emphasizing the liver, kidneys, nervous system, lungs, heart, and blood should be provided. Workers exposed to concentrations greater than the action level (50 ppm) should be examined at least once a year. Use of alcohol can aggravate the toxic effects of toluene.

COMMENTS: Empty containers contain product residues. Handle accordingly!

Toluene is designated as a hazardous substance by the EPA (40 CFR 116). DOT Classification: Flammable liquid. UN1294.

Data Source(s) Code: 1-9, 12, 16, 20, 21, 24, 26, 34, 81, 82. CR

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Approvals *J.O. Rebeco, 11/86.*

Indust. Hygiene/Safety *JW p-86*

Medical Review *[Signature]*

MATERIAL SAFETY DATA SHEET

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(518) 377-8855



No. 43

TRISODIUM PHOSPHATE
DODECAHYDRATE

Date November 1978

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: TRISODIUM PHOSPHATE DODECAHYDRATE

DESCRIPTION: Crystallizes from water as $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$ and can exist as several hydrate forms, depending on processing, and as the anhydrous salt.

OTHER DESIGNATIONS: TSP, Trisodium Orthophosphate, Sodium Phosphate, Tribasic, Tertiary Sodium Phosphate, GE Material D4K1, ASTM D538, CAS# 007 601 549

MANUFACTURER: Available from several suppliers, including FMC Corporation, Monsanto Co., Stauffer Chemical Co., and Olin Corp.

SECTION II. INGREDIENTS AND HAZARDS

Trisodium Phosphate (as $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$)

> 97

HAZARD DATA

No TLV established*

*Under OSHA inert dust limits it can be assumed that air-borne particulate, not otherwise controlled, is limited to a maximum of 5 mg/kg of respirable dust; however, this level may not be adequate to prevent irritation with this material.

($\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$)
Rat, Oral
LD₅₀ 7400 mg/kg

SECTION III. PHYSICAL DATA

Boiling point ----- $-11 \text{ H}_2\text{O}$ at 100 C
(decomposes)

Specific gravity (20/4 C) ----- 1.62

Melting point, deg C -- >73.3 (dec)

pH of 1% water solution at 25 C - ca 12

Solubility, g/100g H_2O :

at 0 C ----- 1.5

at 15 C ----- 28.3

at 70 C ----- 157

Appearance & Odor: White or colorless crystalline solid (also as powder flake, granules, etc.).
No odor.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air	LOWER	UPPER
None	None	None		

Extinguishing Media: Use that which is appropriate to the surrounding fire; this material is non-combustible.

In a fire situation at high temperature phosphates can emit highly toxic phosphorus oxide fumes. Firefighters should use self-contained breathing apparatus.

SECTION V. REACTIVITY DATA

This material is a stable alkaline solid at room temperature. It does not undergo hazardous polymerization.

It is incompatible with acidic materials.

SECTION VI. HEALTH HAZARD INFORMATION	TLV None established (See Sect II)						
<p>This alkaline material will cause irritation to the respiratory tract if inhaled as a dust or as a solution mist. Prolonged or repeated skin contact will irritate the skin. Eye contact will irritate and can damage the eyes (alkaline attack). This material is low in toxicity by ingestion, but its alkaline nature will irritate, injure the digestive tract. (Trisodium phosphate is used as a food additive; but it must be reduced in alkalinity before being taken into the body.)</p> <p>FIRST AID:</p> <p><u>Eye contact:</u> Promptly flush with plenty of water for 15 minutes. Get medical help.</p> <p><u>Skin contact:</u> Wash well with soap and water; rinse well with water. If irritation persists, get medical help.</p> <p><u>Inhalation:</u> Remove to fresh air. Get medical help if irritation persists.</p> <p><u>Ingestion:</u> Give 1-2 glasses of water or milk to drink to dilute; then give fruit juice or diluted vinegar to drink. Do not induce vomiting! Immediately contact a physician.</p>							
SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES							
<p>For large spills, notify safety personnel. Clean-up personnel should use protection against contact or inhalation of dust or mist. Scoop up spill for recovery or disposal and place in a container with a lid. Flush residues to the sewer with plenty of water.</p> <p>DISPOSAL: Scrap material can be used for neutralizing acidic wastes, or it can be buried in an approved manner in an approved landfill. Small amounts can be flushed to the sewer if regulations permit. Follow Federal, State and local regulations for disposal.</p>							
SECTION VIII. SPECIAL PROTECTION INFORMATION							
<p>Provide general ventilation to the workplace; if dusting conditions occur, local exhaust ventilation will be needed and a NIOSH approved dust respirator may be required. The use of rubber or plastic gloves and chemical safety glasses with side shields is recommended for handling this material. An apron may also be desirable to prevent contact with clothing, especially where solutions are involved.</p> <p>Provide eyewash station near to the workplace where this material is used; a safety shower may also be needed where large amounts of solution are prepared or used.</p>							
SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS							
<p>Store this material in tightly sealed containers in a clean, dry, ventilated area. Prevent physical damage to containers.</p> <p>Avoid contact with the body and inhalation of dust.</p> <p>Note that anhydrous trisodium phosphate and lower hydrates are more alkaline <u>on a weight basis</u> than $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$.</p>							
<p>DATA SOURCE(S) CODE: 1,2,4-7,12,15</p> <p><small>Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, Genium Publishing Corporation extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.</small></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">APPROVALS: MIS, CRD</td> <td style="padding: 2px;"><i>J. M. [Signature]</i></td> </tr> <tr> <td style="padding: 2px;">Industrial Hygiene and Safety</td> <td style="padding: 2px;"><i>[Signature]</i></td> </tr> <tr> <td style="padding: 2px;">Corporate Medical Staff</td> <td style="padding: 2px;"><i>George F. [Signature]</i></td> </tr> </table>	APPROVALS: MIS, CRD	<i>J. M. [Signature]</i>	Industrial Hygiene and Safety	<i>[Signature]</i>	Corporate Medical Staff	<i>George F. [Signature]</i>
APPROVALS: MIS, CRD	<i>J. M. [Signature]</i>						
Industrial Hygiene and Safety	<i>[Signature]</i>						
Corporate Medical Staff	<i>George F. [Signature]</i>						

Material Safety Data Sheet

From Genium's Reference Collection
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GENIUM PUBLISHING CORP.

No. 318

XYLENE (Mixed Isomers)
(Revision D)
Issued: November 1980
Revised: August 1988

26

SECTION 1. MATERIAL IDENTIFICATION

Material Name: XYLENE (Mixed Isomers)
Description (Origin/Uses): Used as a raw material for the production of benzoic acid, phthalic anhydride, isophthalic and terephthalic acids and their dimethyl esters in the manufacture of polyester fibers; in sterilizing catgut; with Canadian balsam as oil-immersion in microscopy; and as a cleaning agent in microscopic techniques.
Other Designations: Dimethylbenzene; Xylol; C_8H_{10} ; CAS No. 1330-20-7
Manufacturer: Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek*
Buyers' Guide (Genium ref. 73) for a list of suppliers.
Comments: Although there are three different isomers of xylene (*ortho*, *meta*, and *para*), the health and physical hazards of all three isomers are very similar. This MSDS is written for a xylene mixture of all three isomers, which is usually commercial xylene.



NFPA

HMIS
H 2 R 1
F 3 I 3
R 0 S 2
PPG* K 3
*See sect. 8

SECTION 2. INGREDIENTS AND HAZARDS

%

EXPOSURE LIMITS

Xylene (Mixed Isomers), CAS No. 1330-20-7*

**

IDLH*** Level: 1000 ppm

*o-Xylene, CAS No. 0095-47-6

m-Xylene, CAS No. 0108-38-3

p-Xylene, CAS No. 0106-42-3

***Check with your supplier to determine if there are additions, contaminants, or impurities (such as benzene) that are present in reportable quantities per 29 CFR 1910.

***Immediately dangerous to life and health.

**** See NIOSH, RTECS (No. ZE2100000), for additional data with references to reproductive, irritative, and mutagenic effects.

OSHA PEL
8-Hr TWA: 100 ppm, 435 mg/m³
ACGIH TLVs, 1987-88
TLV-TWA: 100 ppm, 435 mg/m³
TLV-STEL: 150 ppm, 655 mg/m³

Toxicity Data****
Human, Inhalation, TC₀₁: 200 ppm
Man, Inhalation, LC₅₀: 10000 ppm/6 Hrs
Rat, Oral, LD₅₀: 4300 mg/kg

SECTION 3. PHYSICAL DATA

Boiling Point: 275°F to 293°F (135°C to 145°C)*

Melting Point: -13°F (-25°C)

Evaporation Rate: 0.6 Relative to BuAc = 1

Specific Gravity ($H_2O = 1$): 0.86

Water Solubility (%): Insoluble

Molecular Weight: 106 Grams/Mole

% Volatile by Volume: Ca 100

Vapor Pressure: 7 to 9 Torrs at 68°F (20°C)

Vapor Density (Air = 1): 3.7

Appearance and Odor: A clear liquid; aromatic hydrocarbon odor.

*Materials with wider and narrower boiling ranges are commercially available.

SECTION 4. FIRE AND EXPLOSION DATA

LOWER

UPPER

Flash Point and Method

Autoignition Temperature

Flammability Limits in Air

81°F to 90°F (27°C to 32°C)

867°F (464°C)

% by Volume

1%

7%

Extinguishing Media: Use foam, dry chemical, or carbon dioxide. Use water sprays to reduce the rate of burning and to cool containers.

Unusual Fire or Explosion Hazards: Xylene vapor is heavier than air and may travel a considerable distance to a low-lying source of ignition and flash back.

Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facpiece operated in the pressure-demand or positive-pressure mode.

SECTION 5. REACTIVITY DATA

Xylene is stable in closed containers during routine operations. It does not undergo hazardous polymerization.

Chemical Incompatibilities: This material may react dangerously with strong oxidizers.

Conditions to Avoid: Avoid any exposure to sources of ignition and to strong oxidizers.

Hazardous Products of Decomposition: Carbon monoxide (CO) may be evolved during xylene fires.

SECTION 6. HEALTH HAZARD INFORMATION

Xylene is not listed as a carcinogen by the IARC, NTP, or OSHA.

Summary of Risks: Liquid xylene is a skin irritant and causes erythema, dryness, and defatting; prolonged contact may cause blistering. Inhaling xylene can depress the central nervous system (CNS), and ingesting it can result in gastrointestinal disturbance; and possibly hematemesis (vomiting blood). Effects on the eyes, kidneys, liver, lungs, and the CNS are also reported. Medical Conditions Aggravated by Long-Term Exposure: Problems with eyes, skin, central nervous system, kidneys, and liver may be worsened by exposure to xylene. **Target Organs:** CNS, eyes, gastrointestinal tract, blood, liver, kidneys, skin. **Primary Entry:** Inhalation, skin contact/absorption. **Acute Effects:** Dizziness; excitement; drowsiness; incoordination; staggering gait; irritation of eyes, nose, and throat; corneal vacuolization; anorexia; nausea; vomiting; abdominal pain; and dermatitis. **Chronic Effects:** Reversible eye damage, headache, loss of appetite, nervousness, pale skin, and skin rash.

FIRST AID: **Eyes.** Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. **Skin.** Immediately wash the affected area with soap and water. **Inhalation.** Remove the exposed person to fresh air; restore and/or support his or her breathing as needed. Have a trained person administer oxygen. **Ingestion.** Never give anything by mouth to someone who is unconscious or convulsing. Vomiting may occur spontaneously, but do not induce it. If vomiting should occur, keep exposed person's head below his or her hips to prevent aspiration (breathing the liquid xylene into the lungs). Severe hemorrhagic pneumonitis with grave, possibly fatal, pulmonary injury can occur from aspirating very small quantities of xylene.

GET MEDICAL HELP (IN PLANT, PARAMEDIC, COMMUNITY) FOR ALL EXPOSURES. Seek prompt medical assistance for further treatment, observation, and support after first aid. If exposure is severe, hospitalization for at least 72 hours with careful monitoring for delayed onset of pulmonary edema is recommended.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: Notify safety personnel, provide ventilation, and eliminate all sources of ignition immediately. Cleanup personnel need protection against contact with and inhalation of xylene vapor (see sect. 8). Contain large spills and collect waste or absorb it with an inert material such as sand, earth, or vermiculite. Use nonsparking tools to place waste liquid or absorbent into closable containers for disposal. Keep waste out of sewers, watersheds, and waterways.

Waste Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow Federal, state, and local regulations.

OSHA Designations

Air Contaminant (29 CFR 1910.1000 Subpart Z)

EPA Designations (40 CFR 302.4)

RCRA Hazardous Waste, No. U239

CERCLA Hazardous Substance, Reportable Quantity: 1000 lbs (454 kg), per the Clean Water Act (CWA), section 311 (b) (9)

SECTION 8. SPECIAL PROTECTION INFORMATION

Goggles: Always wear protective eyeglasses or chemical safety goggles. Where splashing is possible, wear a full face shield as a supplementary protective measure. Follow OSHA eye- and face-protection regulations (29 CFR 1910.133). **Respirator:** Use a NIOSH-approved respirator per the *NIOSH Pocket Guide to Chemical Hazards* for the maximum-use concentrations and/or the exposure limits cited in section 2. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine use (leaks or cleaning reactor vessels and storage tanks), wear an SCBA with a full facepiece operated in the pressure-demand or positive-pressure mode. **Warning:** Air-purifying respirators will not protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves, boots, aprons, gauntlets, etc., as required by the specifics of the work operation to prevent prolonged or repeated skin contact with xylene. **Ventilation:** Install and operate general and local maximum, explosion-proof ventilation systems powerful enough to maintain airborne levels of xylene below the OSHA PEL standard cited in section 2. Local exhaust ventilation is preferred because it prevents dispersion of xylene into general work areas by eliminating it at its source. Consult the latest edition of Genium reference 103 for detailed recommendations. **Safety Stations:** Make eyewash stations, safety/quick-drench showers, and washing facilities available in areas of use and handling. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. Do not wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean xylene from shoes and equipment. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material. Keep it off of your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do not eat, drink, or smoke in any work area. Do not inhale xylene vapor.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage/Segregation: Store xylene in a cool, dry, well-ventilated area away from sources of ignition and strong oxidizers. Protect containers from physical damage.

Special Handling/Storage: Make sure all engineering systems (production, transportation) are of maximum explosion-proof design. Ground and bond all containers, pipelines, etc., used in shipping, transferring, reacting, producing, and sampling operations.

Transportation Data (49 CFR 172.101-2)

DOT Shipping Name: Xylene

DOT ID No. UN1307

DOT Label: Flammable Liquid

DOT Hazard Class: Flammable Liquid

IMO Label: Flammable Liquid

IMO Class: 3.2 or 3.3

References: 1, 2, 12, 73, 84-94, 100, 103.

Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, Genium Publishing Corp. extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.

Prepared by PJ Igoe, BS

Industrial Hygiene Review: DJ Wilson, CIH

Medical Review: MJ Hardies, MD

APPENDIX D



OHM Corporation

HEALTH & SAFETY PROCEDURES

PERSONAL LIFTING SAFETY

PROCEDURE NUMBER 33

Page 1 of 2

LAST REVISED 12/92 APPROVED BY: JFK/FHH

1. OBJECTIVE

All OHM Remediation Services Corp. (OHM) employees will use the proper lifting techniques and will utilize mechanical means when an objects' weight or bulk cannot be safely lifted by manual means.

2. PURPOSE

This procedure provides the proper lifting technique to be used by OHM employees. By utilizing proper technique, OHM employees can avoid debilitating lower back injuries.

3. REQUIREMENTS

3.1 Use mechanical material handling equipment whenever practical; however, mechanical lifting equipment shall be used only by qualified personnel.

3.2 If the material must be lifted manually, the following procedures apply:

3.2.1 Make certain that the load lifted can be safely handled. Consider the size, weight, and shape of the load. If necessary, get help.

3.2.2 Warm up for the lift by bending, stretching, and turning.

3.2.3 Do not attempt to lift more than 60 pounds.

3.2.4 Ensure proper lifting technique as follows.

- Place feet about shoulder width apart.
- Place one foot alongside the object being lifted and the other foot in front of the object.
- Bend at the knees to grasp the load.
- Maintain slight arch in the back when positioning over load.
- Draw the load close to the body, keeping the arms and elbows tucked into the side of the body.

- Take a firm hold on the load with the palms of the hands, not just the fingers.
- Maintain same slight arch in the back.
- Lift gradually, using your leg muscles. Make sure you draw the load close to your body.
- Do not twist the body when lifting. If you have to change direction, turn with your feet, not your trunk.
- Carry the object close to the body and watch where you are going. Do not carry objects in a manner that obstructs your vision.
- Avoid throwing or dropping objects. When lowering, maintain a firm grip. Watch out for pinching of the fingers. Use your leg muscles to lower the object by bending at the knees and keeping your back straight.

APPENDIX E



OHM Corporation

HEALTH & SAFETY PROCEDURES

SLIP, TRIP, AND FALL PREVENTION

PROCEDURE NUMBER 34

Page 1 of 2

LAST REVISED 12/92

APPROVED BY: JFK/FHH

1. OBJECTIVE

All OHM Remediation Services Corp. (OHM) employees and contractors shall attempt to identify and eliminate situations where injuries or "near misses" could occur from slip, trip, or fall hazards.

2. PURPOSE

This procedure describes work practices that will reduce or eliminate slips, trips, and falls and thereby reduce or prevent the injuries associated with these types of accidents. The intent is to prevent injuries and maintain an efficient and healthy workforce.

3. REQUIREMENTS

- 3.1 Personnel shall keep the working area clean and orderly. Tools must not be left lying on the floor or decking where they present tripping hazards during a job or after a job is completed.
- 3.2 Small, loose items such as, disconnected joints of pipe, wood chips, other small objects and debris shall not be left lying around in any place, particularly in areas where personnel walk.
- 3.3 Walkways and grating shall be kept in good condition. Openings in walkways shall be repaired immediately, if possible. If not immediately repaired, the section must be roped off or closed until repairs can be made.
- 3.4 Holes in gratings shall be covered or surrounded by an adequate guard rail.
- 3.5 Oil spills and slippery spots shall be cleaned up immediately.
- 3.6 Extra precautions must be taken when walking on steel decking or catwalks during wet weather.
- 3.7 Personnel shall not take dangerous shortcuts. They shall avoid jumping from elevated places.
- 3.8 Personnel must always position themselves properly when using tools.

- 3.9 Personnel shall not walk or climb on piping, valves, fittings or any other equipment not designed as walking surfaces.
- 3.10 Stairways, walkovers or ramps shall be installed where personnel must walk or step over equipment in the course of their normal duties.

APPENDIX F



OHM Corporation

HEALTH & SAFETY PROCEDURES

SOLVENTS AND FLAMMABLE LIQUIDS

PROCEDURE NUMBER 39

Page 1 of 6

LAST REVISED 12/92 APPROVED BY: JFK/FHH

1. OBJECTIVE

It is the intent OHM Remediation Services Corp. (OHM) to protect employees against exposures to, and fires involving solvents and flammable or combustible liquids. All employees who may work with such materials must be familiar with and comply with the provisions of this procedure.

2. PURPOSE

This procedure outlines general precautions that are to be taken by personnel when handling solvents and flammable or combustible liquids. Precautions and required personal protective equipment (PPE) for specific chemicals are included in Material Safety Data Sheets (MSDS). This procedure is an overview of 29 CFR 1910.106. If questions arise concerning flammable or combustibles or the labeling of flammable or combustible liquid containers, reference should be made to the above standard. In the event of a conflict between the referenced standard and the MSDS, the more stringent requirement will prevail.

3. DEFINITIONS

- 3.1 Hydrocarbon solvents are compounds consisting solely of hydrogen and carbon atoms. They are flammable in varying degrees and may leave a combustible residue or oily film.
- 3.2 Alcohols are hydrocarbon derivatives in which one or more hydrogen atoms have been replaced by a hydroxyl group (oxygen-hydrogen). They are flammable, water soluble, and leave no film.
- 3.3 Ketones are hydrocarbon derivatives containing oxygen atoms. They are flammable, water soluble, and dissolve some materials not affected by hydrocarbons or alcohols.
- 3.4 Halogenated hydrocarbons are organic compounds containing chlorine, fluorine, and/or other halogens. They are primarily non-flammable and leave no oily residue. Depending on their boiling point, they are used cold or in heated vapor degreasers. When exposed to flames, hot surfaces, or welding arcs, vapors of these materials decompose into highly toxic and corrosive vapors, such as phosgene or hydrogen chloride.

- 3.5 Flammable solvents are classified according to flashpoints and boiling points.
- 3.6 TLV is the acronym for threshold limit value. Atmospheric contaminants in the form of gas or vapor are generally expressed as parts per million (ppm) by volume denoting parts of the material in 1,000,000 parts of air. Threshold limit values are the occupationally acceptable limits set by the American Conference of Governmental Industrial Hygienists to which most employees may be continuously exposed during their 8 hour working days without any adverse effect on their health.
- 3.7 Boiling point is that temperature at which a liquid boils and is an indicator of the relative vapor concentration present over liquids at any given temperature. (The higher the boiling point, the lower the vapor concentration.)
- 3.8 Flash point is that temperature at which sufficient flammable vapors are evolved from a liquid to obtain ignition. (The lower the flash point, the more flammable the solvent.)
- 3.9 Flammability limits denote the range, in percentage by volume, of the material with air which will burn.
- 3.10 Positive ventilation is venting provided by ducting and fans or blowers as opposed to comfort or natural ventilation.
- 3.11 Safety containers are of welded seam construction with excess pressure relieving closure and wire mesh screens to prevent the propagation of flame into the container. Safety containers are painted red (some with one yellow stripe). The container must be plainly labeled as to contents. Containers must be National Fire Protection Association or Underwriters Laboratory approved.

4. SOLVENTS

- 4.1 Skin contact should be avoided. All solvents remove protective oils from the skin on contact, increasing the possibility of dermatitis and infection. Some solvents may be absorbed through the skin to produce systemic effects.
- 4.2 Repeated skin contact can cause a person to become sensitized to a given solvent.

- 4.3 All solvents have varying adverse effects if ingested. Hydrocarbon liquids produce respiratory complications if allowed to enter the lungs.
- 4.4 Vapor concentrations above a given solvent are difficult to predict, depending on the method of dispensing, agitation, temperature, air movement, and confinement. In any case, the concentration will be directly proportional to the area of the surface wetted under a given set of conditions.
- 4.5 Some of the solvent vapors may be detected by odor before the TLV is reached. However, this is not a reliable method for protection against overexposure, since some solvents paralyze the sense of smell.
- 4.6 Miscellaneous solvent supplies in work areas shall be reduced to the minimum amount necessary for daily operation.
- 4.7 Solvent containers for bench use shall be of smallest practical size and shall provide a method of dispensing without pouring (by wetting cloth, squeeze bottle, or plunger type safety container).
- 4.8 All wiping cloths used for solvents shall be placed in a closed container immediately after use.
- 4.9 Disposition of all solvent wastes must be by an environmentally approved method.
- 4.10 Spills shall be cleaned up immediately using respiratory protection. Clear the area of other persons as necessary.
- 4.11 No solvent shall be used in a fashion to permit skin contact with the liquid. In most instances this means that gloves must be worn.
- 4.12 Solvent contaminated clothing must be removed at once.
- 4.13 All use of solvent not in positively ventilated equipment or in an outside area shall require the use of respiratory protection.
- 4.14 When using solvents inside a pit or confined area, regardless of quantity, personnel must wear adequate respiratory and contact protection and comply with confined space entry procedures.
- 4.15 Containers of solvents shall be labeled with an appropriate warning label.

4.16 The following precautions must be observed when opening full drums of solvents or chemicals:

- When opening full drums, all personnel in the immediate area must wear chemical goggles and a face shield.
- When removing the bung, the barrel must be in an upright position and a proper bung wrench used. The bung is to be loosened one turn, internal drum pressure allowed to reach atmospheric pressure, after which the bung may be removed. Never place your face above a bung when opening.

5. FLAMMABLE AND COMBUSTIBLE LIQUIDS

5.1 Definitions

- **Class I Flammable Liquids:** Includes those having a flash point below 100°F.
- **Class II Combustible Liquids:** Includes those having a flash point at or above 100° F, but below 140° F.
- **Class III Combustible Liquids:** Includes those having a flash point above 140° F, but below 200° F.

5.2 Handling and storing of flammable or combustible liquids in closed or approved safety containers and avoiding exposure of the liquid surface to air are of fundamental importance in preventing potential fires or employee exposure.

5.3 Signs for flammable or combustible liquids are as follows:

- Flash point of 20° F or below: "DANGER! EXTREMELY FLAMMABLE."
- Flash point from 20° F to 100° F: "WARNING! FLAMMABLE."
- Flash point from 100° F to 200° F: "CAUTION! COMBUSTIBLE."

6. HANDLING AND DISPENSING

6.1 Drums or other containers containing flammable and combustible liquids should be stored in compliance with 29 CFR 1910.106 (d). All drums are to be electrically grounded. Drip trays are to be provided under drum spigots.

- 6.2 A bond (metal-to-metal grounding strap) is to be established between the container and drum prior to filling a container from the storage drum. Drums are to be equipped with an approved type safety faucet and flexible metal hose. A pressure-vacuum relief vent is required for drums of flammable or combustible liquids.
- 6.3 Except in unusual cases as approved by the site safety officer, the maximum amount of flammable or combustible solvent (used for cleaning purposes) at any work station is limited to one quart.
- 6.4 Rags, kimwipes, etc. that are contaminated with flammable or combustible liquids are to be placed in a safety container equipped with a fusible link lid.
- 6.5 All containers of flammable or combustible liquids must be properly identified as to contents.
- 6.6 Spill containment is required for all drum dispensing areas.
- 6.7 All manually handled flammable or combustible liquids shall be handled in approved safety cans of not more than 5 gallons capacity, having a spring closing and flush arrestor and so designed that it will safely relieve internal pressure when subjected to heat or fire exposure.
- 6.8 Where flammable or combustible solvents must be used in wash containers, such as for paint sprayer cleaning, the container must be provided with self-closing or fusible link closure.
- 6.9 Flammable liquids in portable containers excess to the daily supply must be stored in approved flammable liquid storage cabinets maintained closed with the door latched each time after use.
- 6.10 Containers of flammable or combustible liquids shall be labeled with an appropriate warning label.
- 6.11 NO SMOKING signs are to be posted in areas where flammable or combustible liquids are stored, dispensed, or used.
- 6.12 Additional information and requirements for handling and storage of specific flammable or combustible liquids are included in the MSDS's or site safety plans.
- 6.13 A suitable storage area must be designated for flammable or combustibles on temporary job sites.

7. PAINT SPRAY BOOTHS

- 7.1** Spray booths are power-ventilated structures designed to enclose spraying operations, confine and limit the escape of spray, vapor, and residue, and to safely conduct or direct them to an exhaust system. Spray booths must be built to the specifications of 29 CFR 1910.107 (b), have electrical and other sources of ignition designed to conform with 29 CFR 1910.107 (c), and have ventilation designed to conform with 29 CFR 1910.107 (d).
- 7.2** The storage of flammable and combustible liquids shall be in conformance with 29 CFR 1910.106 and .107 (e). The quantity of flammable liquids kept in the vicinity of spraying operations shall be the minimum required for the operations and should ordinarily not exceed a supply for one day or one shift.
- 7.3** The room will have an automatic sprinkler system conforming to the requirements of 29 CFR 1910.159 and .107 (f). Special emphasis must be given to keeping sprinkler heads free of paint spray and residue. An adequate supply of suitable portable fire extinguishers shall be installed near all paint spray operations.
- 7.4** Spray booths shall not be used alternately for different types of coating materials, where the combination of the materials may be conducive to spontaneous ignition, unless all deposits of the first used material are removed from the booth and exhaust ducts prior to spraying with the second used material.
- 7.5** "NO SMOKING" signs in large letters on contrasting color background shall be conspicuously posted at all spraying areas and paint storage areas.
- 7.6** The OHM facility safety compliance coordinator will perform air movement testing and monitoring quarterly to insure that at least 100 fpm of air movement is maintained. The OHM facility safety compliance coordinator will also establish respirator requirements for painting.

APPENDIX G



OHM Corporation

HEALTH & SAFETY PROCEDURES

ELECTRICAL SAFETY

PROCEDURE NUMBER 38

Page 1 of 5

LAST REVISED 12/92

APPROVED BY: JFK/FHH

1. OBJECTIVE

OHM Remediation Services Corp. (OHM) personnel performing work on electrical systems and equipment will follow standards set by the National Electrical Code (NEC) and OSHA in selection of materials and methods of installation and maintenance. Only qualified personnel will work on electrical systems and equipment.

2. PURPOSE

This procedure specifies the requirements for electrical equipment and methods and is an overview of the requirements of 29 CFR 1910, Subpart S-Electrical. If work is to be performed on any electrical circuit, lockout/tagout may be required. Refer to the Lockout/Tagout procedure.

3. GENERAL REQUIREMENTS

- 3.1 No electrical work should be done on an energized circuit.
- 3.2 Only approved electricians will be permitted to work on electrical equipment or permanent electrical wiring.
- 3.3 Use proper clearance and grounding procedures. All electrical circuits and equipment shall be de-energized and lockout/tagout accomplished before maintenance or repair work is started.
- 3.4 Single-phase electric hand tools and other single-phase portable electrical equipment must be approved by a recognized testing agency, and all exposed non-current-carrying metal parts must be grounded, or be double insulated.
- 3.5 Before each use, portable electrical appliances are to be examined for obvious deficiencies in the appliance, cord, and plug. If any deficiency is noted, the appliance is not to be used.

- 3.6. Extension cords are to be kept clean, dry, free of kinks, and protected from oil, hot or sharp surfaces, and chemicals. Extension cords used outdoors shall be Ground Fault Circuit Interrupter (GFCI) protected. All extension cords shall be free from damage and are not to be placed across aisles, through doors, through holes in a wall, or in areas where the cord may be damaged or become a tripping hazard. Extension cords must not be placed in walkways, or on stairs or steps where the cords may pose a tripping hazard.

4. PORTABLE ELECTRICAL EQUIPMENT

- 4.1 Double insulated portable industrial type electric tools meeting the requirements of the Underwriters Laboratory are authorized for use (ground wire not required). Where such a system is employed, the equipment must be distinctly marked.
- 4.2 Portable electrical tools not provided with special insulating or grounding protection are not intended for use in damp, wet or conductive location (persons standing on the ground or on metal floors).
- 4.3 All portable electrical appliances and equipment where the non-current carrying metal parts are exposed to contact by personnel shall be grounded by continuous conductor of adequate capacity from the device to a grounded receptacle. The site safety officer shall resolve any question which arises as to whether or not a particular appliance should be grounded.
- 4.4 Grounding of receptacles shall be accomplished in one of two ways:
- A built-in ground wire of green color may be attached to the ground pole of the receptacle.
 - The conduit system, if installed in an approved manner, may be relied upon for grounding of a receptacle serving single phase appliances with ratings up to 230 volts.
- 4.5 At outside locations all single-phase 15 and 20 ampere receptacle outlets operating at 230 volts or less which are not a part of the permanent wiring of the building or structure must have GFCI for personnel protection. The GFCI should be located at the power source so that all extension cords and tools are protected by the GFCI.

The outlet box for portable extension cords for outdoor use shall be of weatherproof type maintained in good condition.

5. ELECTRICAL GUARDING

- 5.1 Suitable access and working space shall be provided and maintained about all electric equipment to permit ready and safe operation and maintenance of such equipment.
- 5.2 The dimension of the working space is the direction of access to energized parts in switchboards, control panels, fused switches, circuit breakers, panel boards, motor controllers, and similar equipment which require examination, adjustment, servicing, or maintenance while energized, shall not be less than 36" in depth (30" for installations built prior to 1981) and the side being 30" or the width of the equipment, whichever is greater.
- 5.3 The working space shall not be used for storage purposes. The "keep clear" area may be identified with suitable floor markings and/or posting of signs or decals on the equipment.
- 5.4 Energized parts of electrical equipment operating at 50 volts or more shall be guarded against accidental contact by the use of approved cabinets or enclosures.
- 5.5 Entrance to rooms and other guarded location containing exposed energized parts shall be marked with a conspicuous warning sign forbidding unqualified persons to enter.
- 5.6 Temporary covers, warning signs, and/or barricades are to be used when it is necessary to remove covers of electrical panels during construction, major refurbishment, or for the purpose of providing temporary power to an area.
- 5.7 All openings in boxes, enclosures, or fittings shall be effectively guarded or closed to afford protection substantially equivalent to that of the wall of the box, enclosure, or fitting.
- 5.8 All electrical components over 230 volts shall have signs stating "High Voltage" 240 volts.

6. EXTENSION CORD REQUIREMENTS

- 6.1 Extension cords are designed for and will be used for **TEMPORARY USE ONLY!** All other electrical connections will be made permanent by proper construction methods.

- 6.2 Use of indoor extension cords greater than 50 feet in length is to be discouraged. All extension cords shall include a grounding conductor within the cable jacket and shall be equipped at each end with either explosion-proof or non-explosion-proof three-wire, grounded receptacles and plugs (but not with one of each), depending on the location and intended use. (No "hybrid", ungrounded or external ground wire extension cords are allowed.)
- 6.3 If a cord is damaged, it shall be shortened or replaced by an electrician - never patched with electrical tape.
- 6.4 Cords shall be protected against contact with oil, hot surfaces and chemicals.
- 6.5 Cords must not be hung over nails or other sharp edges or placed where vehicles may run over them.

7. ELECTRICAL FUSE REQUIREMENTS

- 7.1 Circuits must be de-energized by lockout and tagout procedures before attempting to replace fuses.
- 7.2 Bridging of fuses or circumventing the normal operation of circuit breakers is prohibited.
- 7.3 Blown fuses shall not be replaced with fuses having a higher amperage or voltage rating. Fuses should be replaced in kind to maintain proper circuit protection.
- 7.4 Use a fuse puller to remove fuses.

8. ASSURED ELECTRICAL GROUNDING REQUIREMENTS

- 8.1 This program provides the minimum requirements for an assured equipment grounding conductor program and reflects the requirements of 29 CFR 1910.304. It also applies to circuits and equipment not attached to a permanent building or structure.
- 8.2 OHM and its contractors will implement either a written assured equipment grounding conductor program or use GFCI's when using temporary wiring (cords and plugs) in field work using any temporary electrical power source.
- 8.3 Cords and equipment will be inspected prior to each use for damage or missing parts. Equipment which is found to be defective will be taken out of service and repaired.

8.4 The Assured Equipment Grounding Conductor Program will include the following:

- **This written program.**
- **Designation of a competent person(s) to implement the program.**
- **Visual inspection of cords on a daily basis for deformed and missing pins, insulation damage, and indications of possible internal damage. Equipment found damaged or defective will be removed from service and repaired or expended.**
- **Cords and electrical circuits will be tested for the following:**
 - **Electrical grounding continuity**
 - **Correct attachment of grounding conductor**
- **Tests outlined above shall be performed before the first use, before being returned to use after repair, after possible damage (such as being run over by a vehicle), and at least every three months.**
- **The tests outlined above must be recorded and cords which have been tested identified.**

APPENDIX C

SAMPLING, ANALYSIS AND QUALITY ASSURANCE PLAN



**SAMPLING, ANALYSIS AND
QUALITY ASSURANCE PLAN
FOR
CHASE INTERIOR
FALCONER, NEW YORK**

Prepared for:

**United States Environmental Protection Agency
Region II - Response and Prevention Branch
Edison, New Jersey**

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**April 7, 1994
OHM Project 15521-2R-021**

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SECTION 1.0 INTRODUCTION

This document has been prepared to guide the sampling and analytical tasks necessary for the removal action at the Chase Interior site in Falconer, New York. The work has been authorized by Delivery Order 2001-02-021 of the U.S. EPA Emergency Response Contract 68-S3-2001.

All field sampling, documentation, field analysis and sample management for this project will be conducted by OHM's field analytical group. In preparing this Sampling and Analysis Plan (SAP), OHM has utilized the following documents:

U.S.E.P.A. AUGUST 1987--Compendium of Field Operations Methods. Oswer No. 9335.0-14

U.S.E.P.A.--Sampling for Hazardous Materials

U.S.E.P.A. May 1989--RCRA Facility Investigation Guidance

N.J.D.E.P.E. MAY 1992--Field Sampling Procedures Manual

1.1 SITE HISTORY

The facility was constructed in the late 1800s as the Wooster Wool Mill and operated until approximately 1968, when the plant closed. Between 1968 and 1975, the Crescent Tool Company occupied the building; little is known about operations conducted during this period. In 1975 or 1976, the property was purchased by Frank Chase Cabinet Makers, which subsequently became Chase Interiors.

The facility is predominantly a wood frame construction with some steel beams bracing areas that have subsided. The facility utilized various paints, thinners, shellacs, and adhesives which have flammable, corrosive, and toxic characteristics. The facility had three flammable storage areas to store materials, but the areas were not necessarily complying with appropriate regulations.

During the assessment, it was noted that there were four main storage areas. The materials were partially organized by a contractor hired by the mortgagor to conduct a cleanup. The areas were overcrowded with containers, some containers were leaking, five-gallon pails were stacked four high and "secured" with duct tape, with the distance between rows less than two feet. The shelves in the Paint Room were mostly cardboard-covered metal bars. Upon entering the room, readings with the OVA were above 100 units and maintained 30 units while in the room. There is no ventilation or sprinkler system; electrical power has been disconnected in the building.

There are no known environmentally sensitive areas such as schools, recreation areas, wildlife refuges, etc., adjacent to or near the site. Although a business is on the site at the northeast corner, this does not propose to be a problem.

SECTION 2.0

SAMPLING AND ANALYSIS TASKS

2.1 OBJECTIVES

OHM has identified the following sampling and analytical tasks as necessary for the successful removal action at the Chase Interiors site. A detailed discussion of the technical approach to these identified tasks is presented subsequent to this overview.

- Sample collection, field haz-cat analysis, field test bulking and laboratory analysis of approximately 71 drummed wastes, 537 five gallon pails, 3 seven gallon pails, and 32 four cubic yard boxes of 1 or less gallon containers
- Sample collection and laboratory analysis of soils associated with the drum storage areas may be needed

2.2 CONTAINERIZED WASTE SAMPLING

Sampling of containerized waste will occur only after the container has been evaluated from a health and safety stand point. Containers which appear bulged or under pressure will be remotely opened. Any previous records, container content labels or manufactures labels will be consulted before opening any container.

Initial container condition and physical waste descriptions are conducted by the OHM sampling team and recorded on the Drum Inventory Log. The container is also assigned a unique I.D. numbers for future reference at this time. This log is also used to enter the results of the field compatibility testing. The OHM Drum Inventory Log is presented as Figure 2.1.

2.2.1 Liquid Wastes

Liquids in a container will be sampled using 4 foot sections of glass tubing or pipette (8 to 12 mm ID). The pipette is slowly lowered into the drum. When the bottom of the drum is reached, the sampler places a thumb over the end of the pipette and retrieves it. Any liquid or sludge layering in the container should now be apparent as the tube is brought up. The contents of the tube are then released into an 8-ounce sample bottle. The process is repeated until sufficient sample has been collected. Sludge or solids underneath a liquid may be sampled by forcing the pipette into it. If the sludge does not run out into the jar, shaking the pipette or tapping it against the side of the bottle may loosen the sample. If this fails, one may break the pipette and put the pieces which have the solid in them in the bottle.

2.2.2 Solid And Semi-Solid Wastes

Solids in a container will be sampled with a disposable inert sample scoop. The sample will then be transferred to a pre-cleaned clear glass 8-ounce wide mouth sample container. If the material must be broken up prior to sampling, a brass hammer and chisel will be used. If the material is too elastic, a piece will be cut off with a razor knife. Reusable sampling tools used will be decontaminated between drums.



SAMPLING AND ANALYSIS TASKS

Figure 2.1

DRUM INVENTORY LOG

3-4

Form 0054
Field Tech. Svcs
07/88



DRUM NO. _____

PROJECT INFORMATION

PROJECT LOCATION _____ PROJECT NUMBER _____
PROJECT CONTACT _____ PHONE _____
LOGGER _____ SAMPLER _____
WEATHER _____ DATE _____ TIME _____

DRUM TYPE: FIBER ☐ STEEL ☐ POLY ☐ STAINLESS STEEL ☐ NICKEL ☐
POLY-LINED ☐ RING TOP ☐ CLOSED TOP ☐ OVERPACKED ☐
DRUM CONDITION: MEETS DOT SPEC ☐ GOOD ☐ FAIR ☐ POOR ☐
DRUM SIZE: 85 ☐ 55 ☐ 42 ☐ 30 ☐ 18 ☐ 10 ☐ 5 ☐ OTHER _____
DRUM CONTENTS: AMOUNT FULL ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ <1/4 ☐ MT ☐

	PHYS. STATE				COLOR	CLARITY			LAYER THICKNESS
	L	L	S	G	USE	C	C	O	
	AYERS	UID	SOLID	EL	STD	LEAR	LOUDY	PAQUE	DOES
					COLORS				
T									
M									
B									

FIELD ANALYSIS

pH _____ SU _____ PID _____ ppm
DOSIMETER _____ mrem/hr
OTHER _____

DRUM LABELS/MARKINGS

DOT HAZ _____ UN/NA _____

MFG NAME _____

CHEMICAL NAME _____

ADDITIONAL INFORMATION _____

LABORATORY COMPATABILITY DATA

Mark if Physical State and Color matches the above information. If not, stop analysis and notify project contact. Further work will not be paid for.

COMPATABILITY CAT. _____

ANALYSTS: _____

DATE PERFORMED: _____

RADIATION: POS = _____ NEG = _____ mrem/hr

PHYSICAL STATE				COLOR	CLARITY			WATER SOL.	REACT	pH	HEAVY MET.	PER	OXID	CH	HA	REL. STAB.	FLASH POINT	PCB	PCB
	L	L	S	G	USE	C	C	O											
	AYERS	UID	SOLID	EL	STD	LEAR	LOUDY	PAQUE	SOLUBILITY	WATER	TEST	TEST	TEST	TEST	TEST	TEST	TEST	TEST	TEST
T																			
M																			
B																			

Comments: _____

PCB Conc. _____ ppm Flash Point _____ °C Compatibility Comp. Bulk # _____

Data Reviewer: _____

Data Review Date: _____

Field Reviewer: _____

Field Review Date: _____

2.2.3 Rinsewaters

Containerized rinse waters generated during site activities will be sampled at the completion of the project. Grab sampling directly from a valve or sample port on the holding tank is the preferred method of sample collection. If this not feasible, or phased contents are discovered in the holding tank, sampling will occur using a stainless steel bacon bomb sampler or chemically inert bottom filling bailer.

2.3 FIELD HAZ-CAT ANALYSIS

Subsequent to the collection of discreet samples from each container, field haz-cat analysis for the initial waste hazards will occur, followed by a bench scale bulking exercise of chemically similar wastes. Following is an overview of OHM's compatibility procedures.

OHM will perform haz-cat analysis on each layer of every sample obtained. Haz-cat analysis is performed to separate and classify the material into compatible groups. Each sample analyzed will be separated into one of the classifications presented in Figure 2.2.

Following is an overview of the field analysis procedures OHM will employ for preliminary hazard identification of Chase Interiors wastes. Not all procedures are run on each sample, the field chemist will proceed to an endpoint as guided by the testing scheme presented in Figure 2.2.

2.3.1 Water Solubility

Each sample is checked for water solubility by placing 1 milliliter (ml) of the sample into a culture tube containing 1 ml of deionized water. The sample is thoroughly mixed and the following observations are noted:

- Sample soluble in water indicates inorganic or polar organic
- Sample partially soluble in water or forms emulsion in water indicates slightly polar organic materials
- Sample insoluble in water and more dense than water indicates halogenated organic compound
- The evaluation of gases or generation of heat indicates the sample is reactive with water
- The result is recorded

2.3.2 Hexane Solubility

Hexane solubility is performed by the same method except that instead of water, 1 ml of hexane is in the culture tube. The following observations are made:

- Sample is soluble in hexane indicates organic
- Sample insoluble in hexane indicates the sample is inorganic or possible alcohol
- The result is recorded

2.3.3 Peroxide Tests

Peroxide test is performed by placing 1 ml of the sample into a culture tube containing a peroxide test strip. The color changing from beige to gray or blue indicates the presence of peroxide. The result is recorded. This test is sensitive to 1 part per million (ppm).

2.3.4 Oxidizer Tests

The oxidizer test is performed by placing 1 ml of the sample into a culture tube containing 1 ml of .1 normal sodium iodide or potassium iodide and then adding three drops starch solution. The starch solution is prepared by adding 5 grams of starch to 800 ml boiling water and diluting to 1 liter. The following observations are made:

- A dark blue color forming immediately indicates a strong oxidizer
- A dark blue color forming in ½ to 1 minute indicates a moderate oxidizer
- A light blue color forming in over ½ to 1 minute indicates a weak oxidizer
- The result is recorded

2.3.5 pH Test

The pH is measured on those samples which are soluble in water and insoluble in hexane.

- The samples with a pH of less than 4 are classified as acids
- All samples with pH greater than 4 and less than 10 are classified as neutrals
- A pH greater than 10 is a base
- The actual pH of the sample is recorded

2.3.6 Cyanide Test

Samples which are classified as neutrals or bases are checked for cyanide by a spot test with a chloramine-T and pyridine/barbituric acid.

- 1 ml of sample will be placed in a test tube or three drops placed on a spot plate
- If the sample has pH greater than 10 (previous test in study), it will be neutralized with a 10 percent hydrochloric acid (HCL) solution
- Three drops of chloramine-T will be added (one drop if spot plate) and mixed
- Equivalent drops of pyridine/barbituric acid solution will be added and mixed

- After 1 minute, the color will be recorded
 - Pink to red, if 0.05 ppm or greater cyanide (CN)
 - Faint yellow if blank

Reagents:

- Chloramine-T dissolve 1.0 gram in 100 ml water; prepared weekly
- Pyridine/Barbituric acid--15 grams of barbituric acid will be placed in a flask; just enough water will be added to make it wet; 75 ml of pyridine will then be added. 15 ml of HCL will be added, mixed, and cooled to room temperature. Then water will be added to 250 ml and mixed. The shelf life is 6 months in a cool, dark place.

Any positive cyanide spot test (ASTM 2036, 1979, sensitive to 0.05 ppm) is quantified with a specific ion electrode (sensitive to 10 ppm) using the following procedures:

- 1 ml of sample is diluted to 100 ml with deionized water
- A scoop of cadmium carbonate is added to remove any sulfur interference
- 1 ml of .01-molar solution of EDTA is added to remove any interfering metal ions
- 1 ml of 10-molar sodium hydroxide solution is added as an ionization stabilizer

Specification electrode is precalibrated with a 10-ppm CN standard. Specific ion electrode is placed in the sample and a reading of the CN content is taken upon stabilization, which takes 1 to 5 minutes. Entire test is positive for CN only if greater than 10 ppm by selective ion electrode method.

2.3.7 PCB Screening

PCB screening is accomplished by analysis of sample composites. Five samples will be extracted and analyzed together to make up this composite. The methodology used for PCB screen determination is SW-846, Method 8080.

- Organic Liquids Preparation--Composite samples are prepared from one to five 1-ml volumes of the drum samples and diluted to a final volume to 10 mls. An aliquot of the thoroughly mixed composite is hydrolyzed with concentrated sulfuric acid. A 1-ml aliquot of hydrolyzed sample is passed through a microflorisil column eluting with 20 mls of hexane for cleanup. The effluent is then concentrated to a final volume of 1 ml and is ready for analysis
- Inorganic Liquid Preparation--Composite samples are prepared from 1 to 50 equal volumes of the samples. The composite sample (50 ml) is extracted in a separatory funnel with three 10-ml volumes of methylene chloride and concentrated to 1 ml. The final extract is acid hydrolyzed and cleaned up with a microflorisil column as in the organic liquid preparation

- Solid Preparation--Composite samples are prepared from one to five 1-gram aliquots of the samples. The composite sample is extracted with a 10-ml volume of hexane. An aliquot of this extract is acid hydrolyzed and cleaned up with a microflorisil column
- Composite Sample Extract Analysis--Composite extracts are screened to a limit of detection of 25 ppm for each sample that comprises the composite. Composite extracts with concentrations above 25 ppm (per sample) are broken down into individual samples which are prepared according to previously stated procedures and analyzed semiquantitatively according to the procedures outlined in EPA Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods

2.3.8 Sulfide Tests

Sulfide tests are performed by placing an aliquot of the sample into a culture tube, acidified using dilute HCl and saturating the sample with cadmium carbonate. The appearance of a yellow precipitate indicates the presence of sulfides.

2.3.9 Organochlorine Test

Organochlorine tests are performed using the Beilstein test. The test is performed by dipping a clean copper wire into the sample and passing the wire through a propane torch flame. The appearance of a green color in the flame indicates chlorine content of greater than 1 percent.

2.4 BENCHSCALE WASTE BLENDING

Following characterization of the samples, a benchscale bulking test of chemically like samples will be conducted. The samples are bulk tested by slowly adding a small proportional aliquot from each sample in the same classification group. Samples from the same compatible group will be bulked in not more than 25 samples per "bulk sample". This bulked composite sample from compatible samples will be submitted for disposal analysis. A five minute waiting period follows each addition, during which the bulked samples are monitored for any gas evolution or exothermic reaction. If a reaction occurs, the bulking test is repeated without the addition of the reactive sample. Upon completion of the benchscale bulk test, the compatible groups are identified. The blending procedure is documented by the chemist using the form presented in Figure 2.3.


By performing compatibility analysis and benchscale bulking tests, OHM reduces the amount of samples that require disposal analysis. This significantly lowers costs while providing an effective means of identifying material for disposal. These tests also provide information for performing on site bulking of wastes for disposal if this method is found to be more cost-effective than individual drum disposal.

2.5 WASTE DISPOSAL ANALYSIS

The data received from the compatibility analysis will be reviewed by OHM's treatability and disposal manager who will determine the most suitable disposal analysis to be performed. This determination will be based on the most cost-effective and feasible method of disposal for each wastestream. Table 2.1 presents the standard lab analyses OHM utilizes for wastes based on the proposed disposal option.

All samples are prepared and analyzed according to SW-846 methods where available. If no SW-846 methods may be applied, another EPA approved method will be used. If no EPA methods are available, a suitable ASTM or APHA method will be used.

Figure 2.3



OHM Corporation

WASTE BLENDING TEST LOG

WASTE STREAM _____

PROJECT NAME:					PROJECT NUMBER:				
PROJECT LOCATION:					PROJECT MANAGER:				
PROJECT CHEMIST:					BLENDING SUPERVISOR:				
DATE BLENDING TEST PERFORMED: / /					PERFORMED BY:				
WASTE STREAM NUMBER:					SUPERVISED BY:				
CAUTION ALL WASTE BLENDING MUST BE PERFORMED IN LISTED SEQUENCE!									
VARIATION FROM THE SEQUENCE ORDER MUST BE APPROVED BY THE									
PROJECT CHEMIST AND PROJECT SUPERVISOR OR PROJECT MANAGER!									

S E Q U E N C E	D R U M N O.	T E S T B L E N D I N G D A T A				S E Q U E N C E	D R U M N O.	T E S T B L E N D I N G D A T A			
		T E M P R I S E °C	G A S E V O L Y N	H A Z R X N Y N	A P P R O V E D T O B L E N D			T E M P R I S E °C	G A S E V O L Y N	H A Z R X N Y N	A P P R O V E D T O B L E N D
1						26					
2						27					
3						28					
4						29					
5						30					
6						31					
7						32					
8						33					
9						34					
10						35					
11						36					
12						37					
13						38					
14						39					
15						40					
16						41					
17						42					
18						43					
19						44					
20						45					
21						46					
22						47					
23						48					
24						49					
25						50					

TO THE BEST OF MY KNOWLEDGE THE INFORMATION GIVEN ON THIS FORM IS
 CORRECT AND ERROR FREE EXCEPT WHERE NOTED IN THE COMMENTS SECTION.

SIGNATURE (PROJECT CHEMIST) _____ DATE: / /

TABLE 2.1
OHM - GUIDELINES FOR DISPOSAL ANALYSES

PACKAGE A [ALL SAMPLES]	
<u>Analysis</u>	<u>Method(s)</u>
Total Solids	160.3
Corrosivity, pH	150.1, 9040, 9045
Flash Pt. Ignitability	1010, 1020
Reactive Sulfide	Sec. 7.3.4.1
Reactive Cyanide	Sec. 7.3.3.2
TCLP Volatile Organics	1311 - 8240, 8260
TCLP Semi-Volatile Organics	1311 - 8270
TCLP Metals	1311 - 6010, 7000's
TCLP Pesticide/Herbicides	1311 - 8080/8015
TCL Volatile Organics	8240, 8260
TCL Semi-Volatile Organics	8270
TCL Pesticide/PCBs	8080
TCL Herbicides	8015
PACKAGE B [INCINERATION DISPOSAL] Package A plus the following:	
% Ash	160.4
BTU	ASTM
Total Halides	9020
Total Sulfur	ASTM
Total Cyanide	9010
TAL Metals and Molybdenum	6010, 7000's
PACKAGE C [LANDFILL DISPOSAL] Package A plus the following:	
Paint Filter Test	9095
Total Cyanide	9010
Total Organic Halogens (TOX)	9020
PACKAGE D [WASTEWATER TREATMENT] Package A plus the following:	
Total Sulfide	3762, 9030
Total Cyanide	9010
Total Phenols	420.1, 9065
TAL Metals and Molybdenum	6010, 7000's

2.6 SOIL SAMPLING AND ANALYSIS

It is not believed that any soils are in need of sampling this point. If soil samples are needed the following will apply.

Sampling of soils will be accomplished using one of two methods:

Surface soils will be sampled using a stainless steel trowel. Since non-volatile species are the analytes of concern, all collected soils will be thoroughly homogenized in a stainless mixing tray before collection into the appropriate laboratory clean container. Documentation and sample management will occur as discussed in Section 4.0.

Subsurface soils will be collected using a stainless hand auger in conjunction with a hydraulic power auger. The power auger will be advanced to the desired depth and removed. A clean hand auger is then inserted into the boring to retrieve the sample aliquot. Sample handling will occur as discussed previously. All reusable sampling equipment will be decontaminated between each sampling location as discussed in Section 4.8.

Following is a summary of the soil samples OHM proposes for the site:

- OHM will superimpose a 25 feet by 25 feet sampling grid over the excavation floor yielding 20 sample points.
- OHM will collect samples from three depth intervals at each grid point; 0 to 6 inches, 6 to 12 inches, and 12 to 18 inches. The two lower horizon samples will be archived at the laboratory pending results of the 0 to 6 inch samples. Elevated concentrations may warrant analysis of the remaining depths to accurately delineate vertical contamination.
- These post excavation samples will be analyzed for parameters determined by EPA.

SECTION 3.0 DATA QUALITY OBJECTIVES

Based on the definitions discussed in Quality Assurance/Quality Control Guidance for Removal Activities, OHM will generate project data meeting the criteria of QA1 and QA2 objectives. Table 3.1 presents the analytical tasks anticipated for the project and the related QA objective.

TABLE 3.1 PROJECT QA/QC OBJECTIVES			
QA/QC OBJECTIVE		SITE TASK	
QA1		<ul style="list-style-type: none">• Real time air monitoring with PID, LEL, dust monitor• Field compatibility analysis (pH, solubility, etc.)	
QA2		<ul style="list-style-type: none">• H&S air samples• PCB screening for compatibility analysis• Laboratory analysis for disposal criteria	

DELIVERABLES			
QA1	QA2A	QA2B	QA3
Field Data	<ul style="list-style-type: none">▶ Chain of Custody▶ Project Narrative<ul style="list-style-type: none">• Date Received/ Date Analyzed• Methods Used▶ QA/QC Narrative<ul style="list-style-type: none">• Sample/Matrix Problems• Dilutions Required• Elevated D.L.s	<ul style="list-style-type: none">▶ Chain of Custody▶ Project Narrative<ul style="list-style-type: none">• QA/QC Narrative• Field Blank• Travel Blank (waters for VOA only)• Field Duplicates (MS, MSD)	<ul style="list-style-type: none">▶ CLP Type Data Package

SECTION 4.0

FIELD SAMPLING QA/QC

Sample integrity is a key element in any project. Sample integrity strengthens the validity of the analytical data, and can be used for legal documentation if needed. Sample integrity is maintained by OHM through proper sample collection, documentation, and sampling equipment maintenance.

4.1 SAMPLE LABELS

Correct sample labeling and the corresponding notation of the sample ID numbers in the field logbook are necessary to prevent misidentification of samples and their eventual results. All sample labels will be filled out legibly and with indelible ink. They will be affixed to the sample container and covered with clear tape. Listed below, Figure 4.1, presents an example of a sample label.

FIGURE 4.1 LABEL SAMPLE		
PROJECT NO.:	DATE:	TIME:
SAMPLE:		
TAKEN BY:		
WITNESS:		

The following information is recorded on the label using indelible ink:

- Project number - 15698
- Date--month, day, and year
- Time--Military time (e.g., 1000, 1400, 2320)
- Samples--Description of sample
- Analyte--Analysis which will be performed, if more than one analysis is being done on samples from that project
- Preservative--If used
- Taken By--Initials of person taking sample
- Witness--Initials of person witnessing or assisting in taking sample
- Sample Number--Assigned from laboratory log book. Write number in blank corners of label. Sample numbers will be assigned numerically starting with 001. The OHM project number (14510) will be used as prefix

Example: 15698

- Number of Jars--Used with duplicate samples or when one jar cannot hold all the sample.

Every sample collected will be labeled in the above manner. Information will be printed neatly, except for initials which can be written. After the sample is collected and the label is securely attached, the sample is logged into the sample log book with the sample number written on the sample label.

4.2 SAMPLE CUSTODY AND HANDLING

An important consideration for the collection of environmental data is the ability to demonstrate that analytical samples have been obtained from predetermined locations and that they have reached the laboratory without alteration. Evidence of collection, shipment, laboratory receipt, and laboratory custody until disposal must be documented to accomplish this. Documentation is accomplished through an Analysis Request and Chain-of-Custody Record that records each sample and the individuals responsible for sample collection, shipment, and receipt. A sample is considered in custody if it is:

- In a person's actual possession
- In view after being in physical possession
- Sealed so that no one can tamper with it after having been in physical custody
- In a secured area, restricted to authorized personnel

Overall, chain-of-custody documentation will begin when laboratory personnel record bottle lot numbers during the transfer of bottles to field personnel. Field personnel will then maintain custody of the bottles until sample collection, at which time they will record in their field notes the lot numbers of all bottles used for each sample. A copy of the lot number information will accompany the samples to the laboratory and will be included in the data packages.

Sample custody will be initiated by field personnel upon collection of samples. Labels and log information will be checked to verify that identification is correct. Samples will be packaged to prevent breakage or leakage during transport. Chain-of-custody information will be supplied with the samples and shipped by commercial carriers. The standard OHM Chain-of-Custody is presented in Exhibit A.

4.3 FIELD DOCUMENTATION

Several types of documentation will be prepared in the field by the project chemist or sampling team in order to record the sampling activities and observations.

- 4.3.1 Field Note Books Field notes regarding all sampling and field activities will be kept in a bound notebook with pre-numbered pages. Indelible ink will be used for all entries. It will include among other things:

Field parameter observations,
Locations of sampling points and corresponding sample numbers,
Documentation of individual samples comprising the composite samples,
Descriptions of deviations from sampling plan,
Signatures of personnel responsible for observations.

4.4 FIELD MANAGEMENT AND SHIPMENT

Upon collection in the field, samples will be properly labeled as discussed and stored in a cool place away from sunlight. Field samples will tighten all container lids, place each sample container in an approved DOT shippable container which will be used to transport samples to the laboratory. Sufficient incombustible, absorbent, cushioning material will be packed in the shipping container to minimize the possibility of sample container breakage. The DOT shippable containers will be secured using nylon strapping tape and custody seals to ensure that samples have not been disturbed during transport. Samples will be promptly shipped to the laboratory so that they arrive within 24 hours of collection. Transportation of samples must be accomplished not only in a manner designed to protect the integrity of the sample, but also to prevent any detrimental effects from the potentially hazardous nature of the samples.

Regulations for packaging, marking, labeling, and shipping of hazardous materials, substances and wastes are promulgated by the U.S. Department of Transportation (DOT) and described in the 49 CFR 171 through 177. In general, these regulations were not intended to cover the shipment of environmental samples collected at hazardous waste sites. Environmental samples usually contain low concentrations of hazardous substances when compared with most of the concentrated materials regulated by the DOT. However, the U.S. EPA has deemed it prudent to package, mark, label, and ship samples observing these DOT procedures, as appropriate.

4.5 LABORATORY MANAGEMENT OF SAMPLES

Laboratory sample receipt generally discussed in either the laboratory QA/QC manual or a laboratory SOP. The laboratory specific procedure for this project can be provided if needed.

In general, the receiving laboratory's sample custodian will:

- Examine all samples and determine if proper temperature has been maintained during shipment. If samples have been damaged during shipment, the remaining samples will be carefully examined to determine whether they were affected. Any samples affected shall also be considered damaged. It will noted on the Analysis Request and Chain-of-Custody Record that specific samples were damaged and that the samples were removed from the sampling program. Field personnel will be notified as soon as possible that samples were damaged and that they must be resampled, or the testing program changed, and an estimate of the cause of damage.
- Compare samples received against those listed on the Chain-of-Custody Record.
- Verify that sample holding times have not been exceeded.
- Sign and date the Analysis Request and Chain-of-Custody Record and attach the waybill to it.
- Denote the samples in the laboratory sample log-in book with contains the following information:
 - Project identification number
 - Sample numbers
 - Type of samples

- Date received in laboratory
- Record of the verified time of sample receipt (VTSR)
- Date put into storage after analysis is completed
- Date of disposal

The last two items will be added to the log when the action is taken.

- Notify the laboratory project manager of sample arrival.
- Place the completed Analysis Request and Chain-of-Custody Records in the project file.

The VTSR is the verified time of sample receipt at the laboratory. The date and time the samples are logged in by the Sample Custodian or designed will agree with the date and time recorded by the person relinquishing the samples. Holding times for the samples associated with this project will begin at the VTSR.

4.6 LABORATORY SAMPLE STORAGE

The primary considerations for sample storage are:

- Maintenance of prescribed temperature, if required, which is typically 4 degrees Celsius
- Extracting and/or analyzing samples within the prescribed holding time for the parameters of interest

The requirements for temperatures and holding times will be followed. Placing of samples in the proper storage environment is the responsibility of the Sample Custodian, or designed, who will notify the Laboratory Group/Team Leaders, or designated representative, if there are any samples which must be analyzed immediately because of holding-time requirements.

4.7 SAMPLE DISPOSAL

The Analysis Request and Chain-of-Custody Record for the sample is completed upon sample disposal.

There are several possibilities for sample disposition:

- The sample may be completely consumed during analysis.
- Samples may be returned to the site for disposal.
- The samples may be stored after analysis. Proper environmental control and holding time must be observed if reanalysis is anticipated. If reanalysis is not anticipated, environmental conditions for storage will not be observed.

4.8 EQUIPMENT DECONTAMINATION

All reusable sampling equipment employed by OHM is thoroughly decontaminated between each sampling location using the following widely accepted protocol:

1. Non-phosphate soap and water rinse
2. Tap water rinse
3. Deionized water rinse
4. 10% nitric acid rinse
5. Deionized water rinse
6. Acetone rinse
7. Air dry
8. Deionized water rise

All decontamination rinsate will be collected on-site prior to proper disposal.

In addition to proper equipment maintenance, latex rubber gloves are worn by OHM sampling personnel and changed between each sampling location.

All sample containers for the project will be pre-cleaned to EPA protocol.

SECTION 5.0 CALIBRATION PROCEDURES AND FREQUENCY

Accuracy of instrumentation and measuring equipment utilized by OHM is maintained through proper maintenance and calibration.

5.1 FIELD INSTRUMENTATION

In general, field instrumentation is calibrated according to the manufacturer recommended procedures. Field instrumentation is calibrated on site daily before use. The results are recorded in the daily documentation.

The frequency, method, and acceptability for calibration of the anticipated instrumentation for this project are presented in Table 5.1.

5.2 LABORATORY CALIBRATION

Calibration of laboratory instrumentation will occur according to any applicable laboratory specific SOP's as well as the selected analytical method.

For this project, instrument calibration will occur according to:

U.S.E.P.A. Test Methods for Evaluating Solid Waste EPA SW-846

TABLE 5.1 SUMMARY OF FIELD EQUIPMENT CALIBRATION Chase Interiors				
Measurement (Instrument)	(Calibration) Frequency	Calibration Standard	Acceptance Limits	Corrective Action
VOCs in air (HNU photoionizer)	Daily, prior to use	Isobutylene Standard - near 60 ppm at span 9.8	±10%	Adjust span (limit to span 8.5); backup unit; office cleaning and recalibration; factory recalibration.
VOCs in air (Organic Vapor Analyzer)	Daily, prior to use	Methane Standard - near 100 ppm	±10%	Backup unit; office recalibration; factory recalibration.
Combustible and % oxygen in air (Combustible gas indicator)	Daily, prior to use	50% LEL Pentane (Pentane 0.75% and Oxygen 15% in nitrogen	LEL-47% to 55% Oxygen-13% to 17%	Adjust span (LEL only); backup unit; office recalibration; factory recalibration.
NBS - National Bureau of Standards VOCs - Volatile Organic Compounds PPM - Parts Per Million LEL - Lower Explosive Limit				

SECTION 6.0 PREVENTATIVE MAINTENANCE AND CORRECTIVE ACTION

Accuracy and precision of both field equipment and laboratory equipment is maintained by OHM through routine maintenance according to the manufacturer's recommendations.

OHM maintains a large inventory of instrumentation and replacement parts in its Northeast Regional shop in Windsor, New Jersey. Backup equipment and replacement parts can be air-shipped overnight to the site if needed. Additional lab chemicals or other field analytical items can also be air-shipped overnight directly from the vendor.

Periodic preventive maintenance is essential for sensitive laboratory analytical instruments. Instrument manuals are kept on file for reference if equipment needs repair. Troubleshooting sections of manuals are often useful in assisting personnel in performing maintenance tasks.

Any equipment requiring routine maintenance will be tagged with a maintenance label indicating the date of required maintenance, the person maintaining the equipment, and the next maintenance date. Information pertaining to life histories of equipment maintenance will be kept in individual equipment history logs with each instrument. Appropriate and sufficient replacement parts of backup equipment will be available so sample and monitoring tasks are not substantially impeded or delayed.